

# **LIHEAP Home Energy Notebook**

## **For Fiscal Year 2008**



**U.S. DEPARTMENT OF  
HEALTH AND HUMAN SERVICES  
Administration for Children and Families  
Office of Community Services  
Division of Energy Assistance  
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# **LIHEAP Home Energy Notebook**

## **For Fiscal Year 2008**

This document has been prepared for the Office of Community Services' Division of Energy Assistance by APPRISE Incorporated under contract #HHSP233200700798P. The statements, findings, conclusions, and recommendations are solely those of analysts from APPRISE and do not necessarily reflect the views of EIA or HHS.

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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
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
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. Reauthorization of LIHEAP 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 2005 Residential Energy Consumption Survey (RECS), which is administered by the Department of Energy’s (DOE’s) Energy Information Administration (EIA). The RECS covers all residential housing units that are primary residences in the United States and contains data for consumption and expenditures for calendar year 2005. All FY 2008 residential energy consumption and expenditures figures for this report have been derived from the 2005 RECS data that were adjusted to reflect FY 2008 weather and fuel prices.

### Residential energy data

In FY 2008, average energy expenditures for all households were \$2,172, and the mean individual energy burden was 7.4 percent of income.<sup>1</sup> Low income households had average energy expenditures of \$1,883, about 13.3 percent lower than the average for all households.<sup>2</sup> The mean individual energy burden for low income households was 14.1 percent, almost twice the mean individual energy burden of all households. LIHEAP recipient households had average energy expenditures of \$2,104, almost 12 percent higher than the average for all low income households. The mean individual energy burden for LIHEAP recipients was 16.8 percent, 9.4 percentage points higher than the mean individual energy burden for all households and 2.7 percentage points higher than the mean individual energy burden for low income households.

Energy prices rose from FY 2007 to FY 2008. Slightly colder weather during the heating season caused a small increase in heating consumption, and a cooler FY 2008 cooling season caused a small reduction in cooling consumption. Average residential energy expenditures for all households

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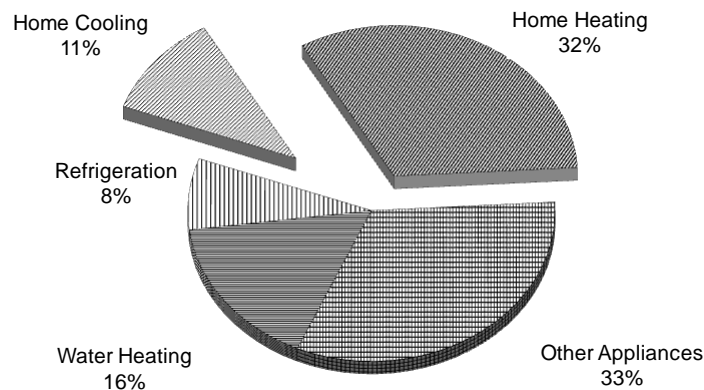
<sup>1</sup> The mean is the sum of all values divided by the number of values. The mean is also referred to as the average. See Appendix A for a discussion of the computation of energy burden statistics.

<sup>2</sup> 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’s poverty income 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.

increased considerably from \$1,986 in FY 2007 to \$2,172 in FY 2008 (over 9 percent) due to the energy price increases.

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 represent about 43 percent of residential energy expenditures for low income households. Refrigerators and freezers represent about 8 percent of residential energy expenditures, water heating represents about 16 percent of residential energy expenditures, and other appliances represent about 33 percent of residential energy expenditures.

**Figure 1. Percent of U.S. residential energy expenditures by low income households, by end use, FY 2008**



### **Home heating data**

The three most common heating fuels in 2005, the most recent year for which household heating fuel usage data are available, were natural gas (53 percent), electricity (30 percent), and fuel oil (7 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 2008, as shown in Figures 2 and 3, average home heating expenditures for all households were \$640, and the mean individual home heating burden was 2.4 percent. Low income households had average home heating expenditures of \$611; this average was about 4.5 percent lower than that for all households. The mean individual home heating burden for low income households was 4.8 percent, twice as much as the mean individual home heating burden for all households. The average home heating expenditures for LIHEAP recipient households was \$839, 37.3 percent higher than the average for low income households and about 31 percent higher than the average for all households. Mean individual home heating burden for LIHEAP recipient households was 7.1 percent, 4.7 percentage points higher than the mean individual home heating burden for all households and 2.3 percentage points 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

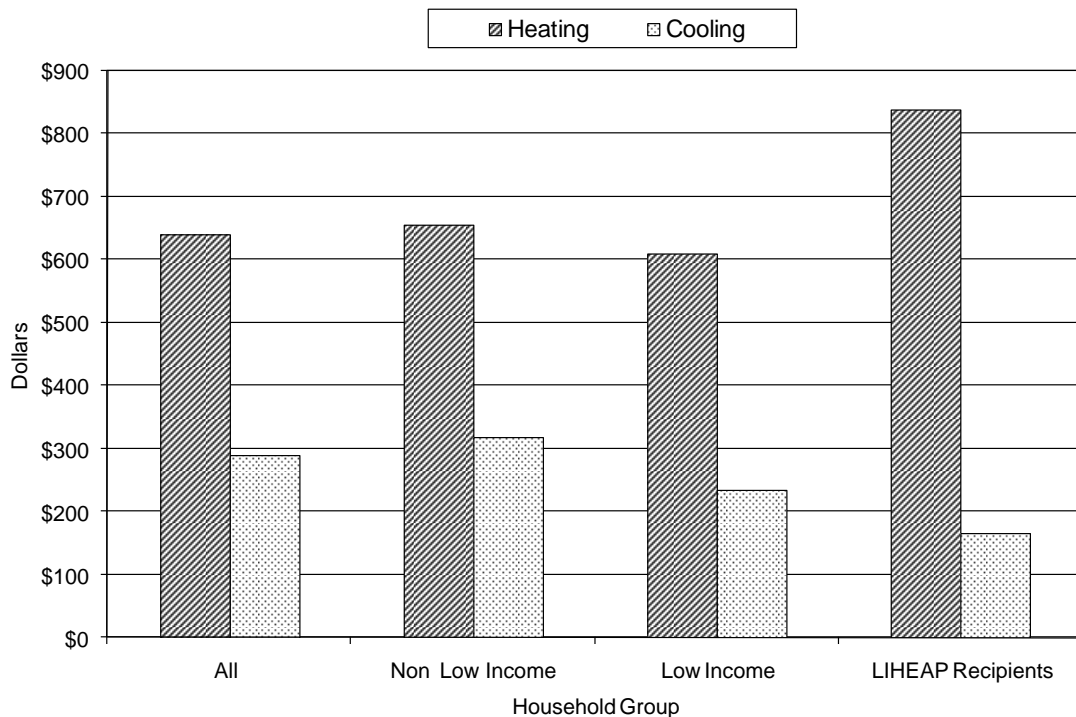
households because LIHEAP heating assistance recipient households tend to live in colder climate regions.<sup>3</sup>

**Home cooling data**

In 2005, about 92 percent of all households cooled their homes using one of the methods recorded by the RECS.<sup>4</sup> Low income and LIHEAP recipient households were less likely to cool their homes than were non low income households; 89 percent of low income households and 86 percent of LIHEAP recipient households cooled their homes using one of these methods.

As Figures 2 and 3 show, in FY 2008, for households that cooled, average home cooling expenditures for all households were \$289, and the mean individual home cooling burden was 1.1 percent. Low income households had average home cooling expenditures of \$234; this average was about 19 percent lower than that for all households. The mean individual home cooling burden for low income households was 2.2 percent, twice as much as the mean individual home cooling burden for all households. Average home cooling expenditures for LIHEAP recipient households were \$165, over 29 percent lower than the average for low income households and almost 43 percent lower than the average for all households. The mean individual home cooling burden for LIHEAP recipient households was 1.3 percent, about 18 percent higher than the mean individual home cooling burden for all households.

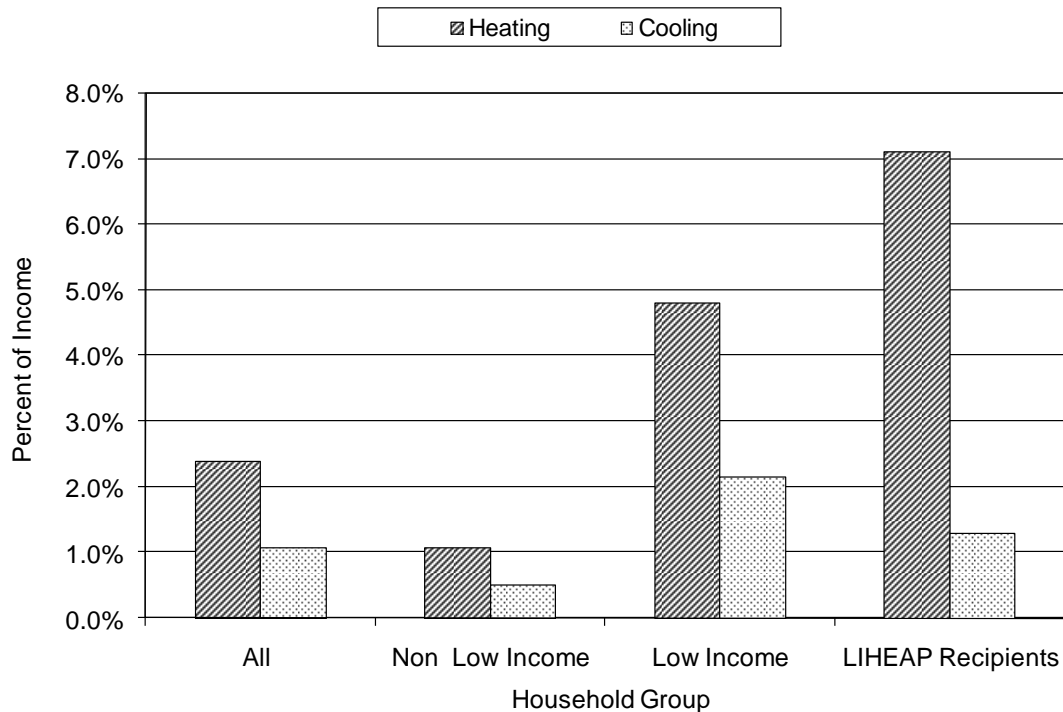
**Figure 2. Mean home heating and home cooling expenditures by all households, non low income households, low income households, and LIHEAP recipient households, FY 2008**



<sup>3</sup> LIHEAP Home Energy Notebook for FY 2006

<sup>4</sup> The 2005 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 2005 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 2008**



## Low income home energy trends

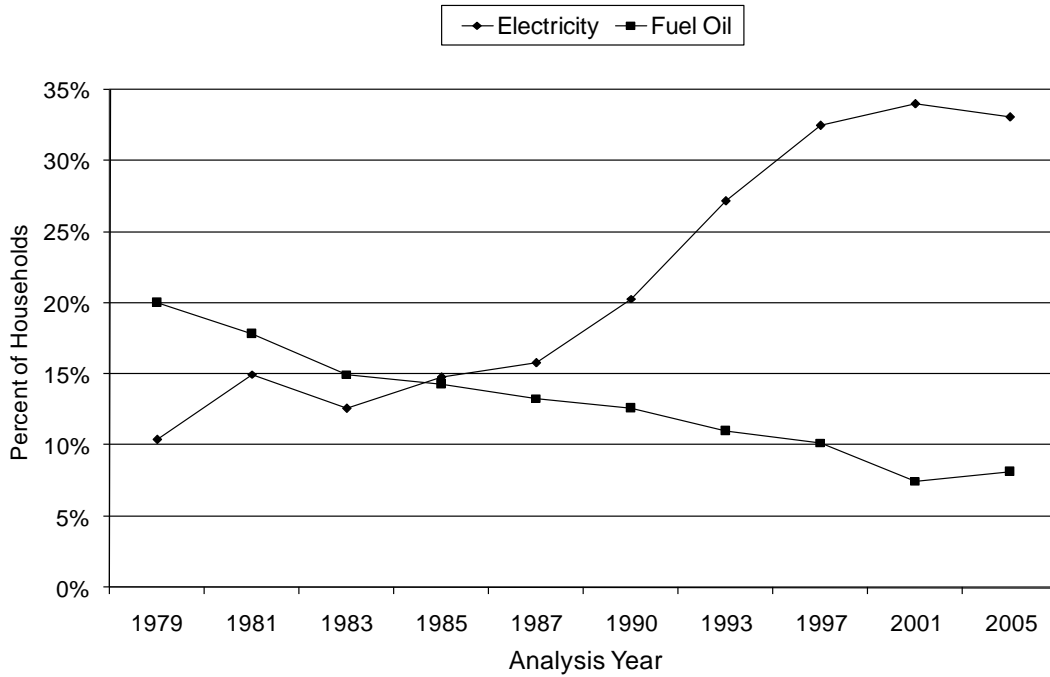
This section presents data on home energy trends for low income households from 1979 through 2005 or FY 2008, depending upon the latest year of availability.<sup>5</sup> Statistics are derived from a series of national residential energy consumption surveys (including the RECS) and from HHS’ administrative 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 10 percent in 1979 to 34 percent in 2001 and dropped slightly to 33 percent in 2005. In contrast, the share of low income households that used fuel oil as their main heating fuel declined from 20 percent in 1979 to 8.1 percent in 2005. Natural gas remained the dominant type of space heating fuel used over the 26-year period.

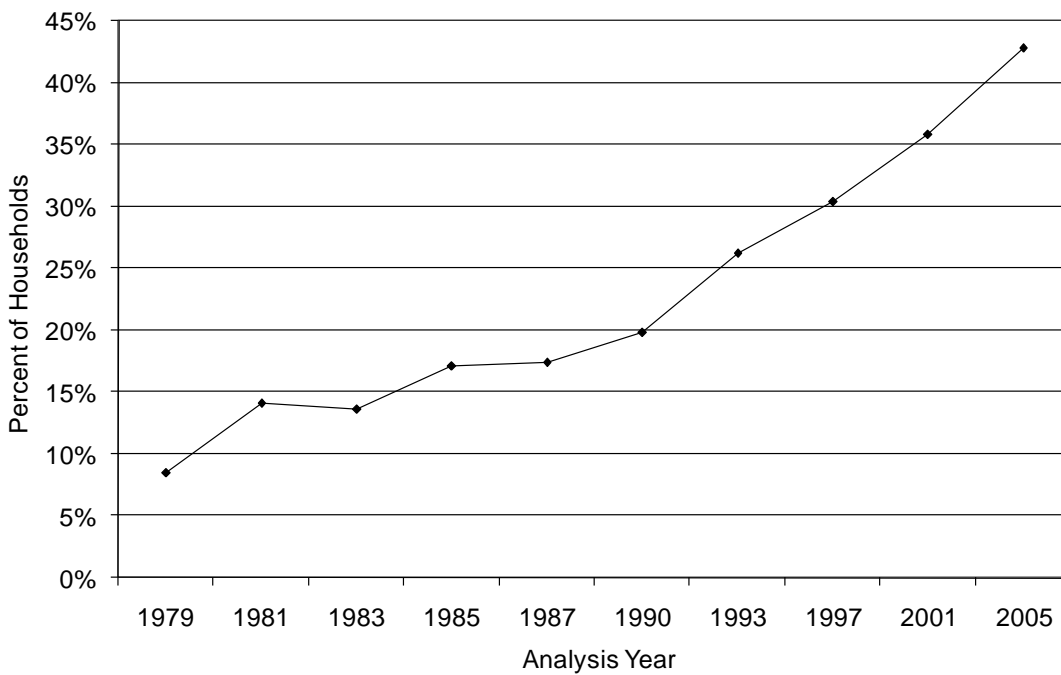
<sup>5</sup>In this section, low income households are defined as those households with incomes at or below 150 percent of HHS’ poverty guidelines.

**Figure 4. Percent of low income households using electricity and fuel oil as main heating fuels, 1979 to 2005**



As shown in Figure 5, the most important change in home cooling on the part of low income households has been in the percent 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 43 percent in 2005.

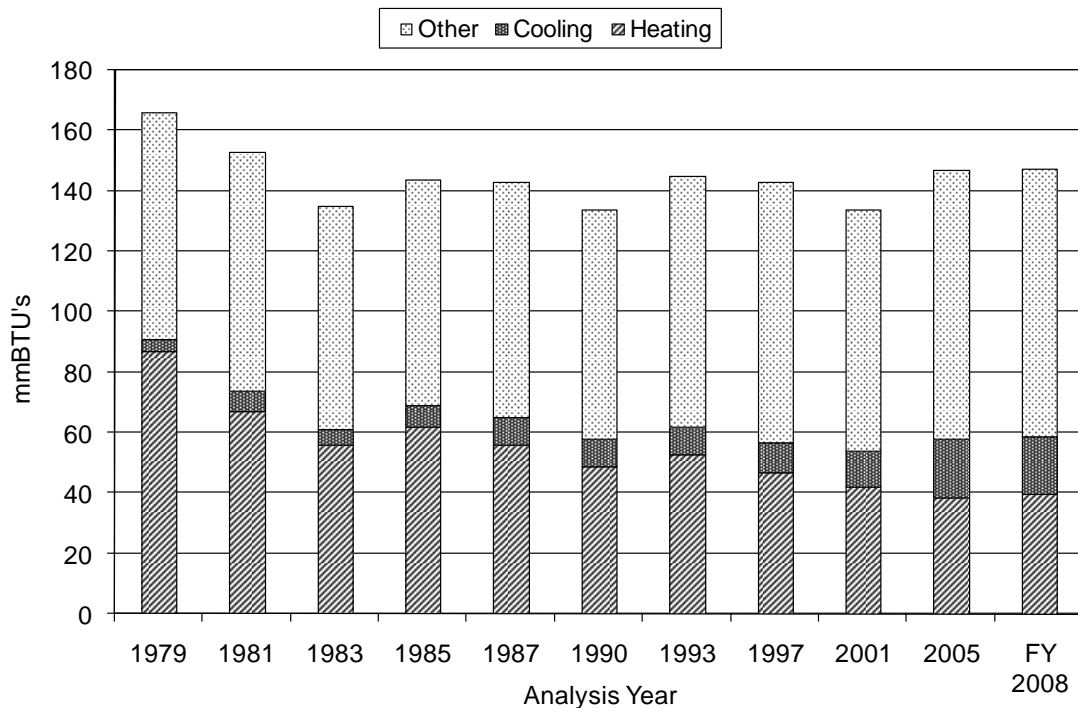
**Figure 5. Percent of low income households using central air-conditioning, 1979 to 2005**



## 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 FY 2008, the use of energy for home heating, home cooling, and for other purposes, appears to have remained stable.

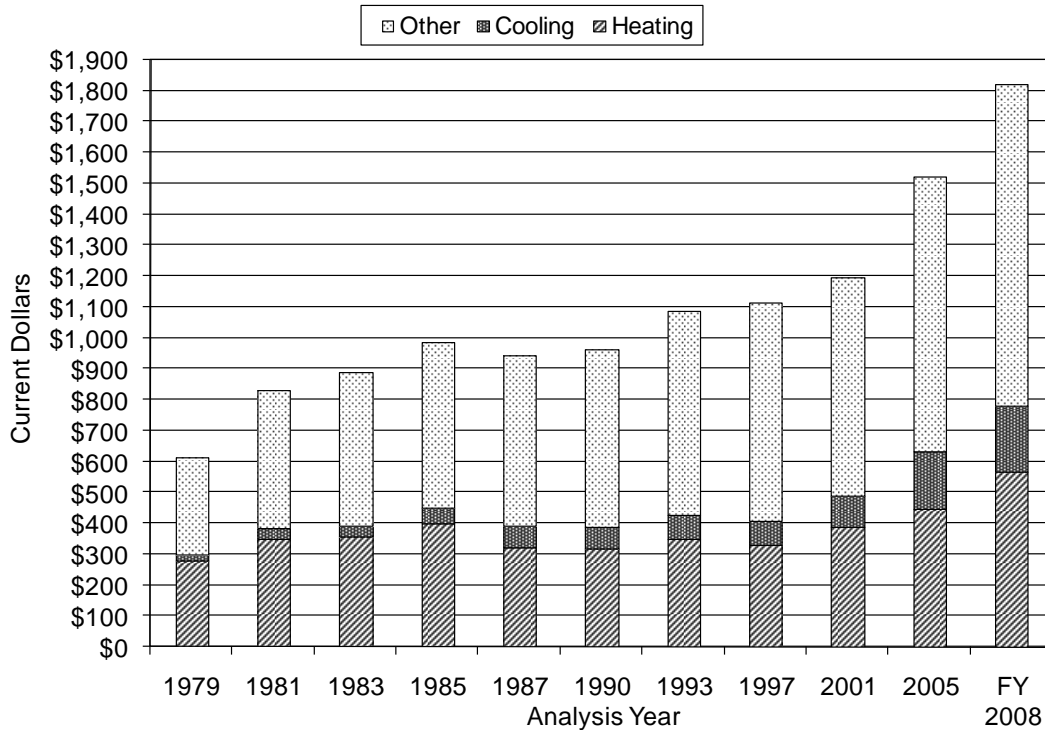
**Figure 6. Mean residential energy consumption (in mmBTUs) per low income household, 1979 to FY 2008<sup>1/</sup>**



<sup>1/</sup> A British Thermal Unit (BTU) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. 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 2005, mean expenditures on heating increased dramatically as the result of fuel price increases and colder winter weather. Between 2005 and FY 2008, mean expenditures for home heating rose by over 26 percent, again due to higher fuel prices. Mean expenditures on uses other than home heating or home cooling rose continuously from 1979 to FY 2008. Mean expenditures on cooling rose from 1979 to 2005, and rose again by almost 15 percent from 2005 to FY 2008.

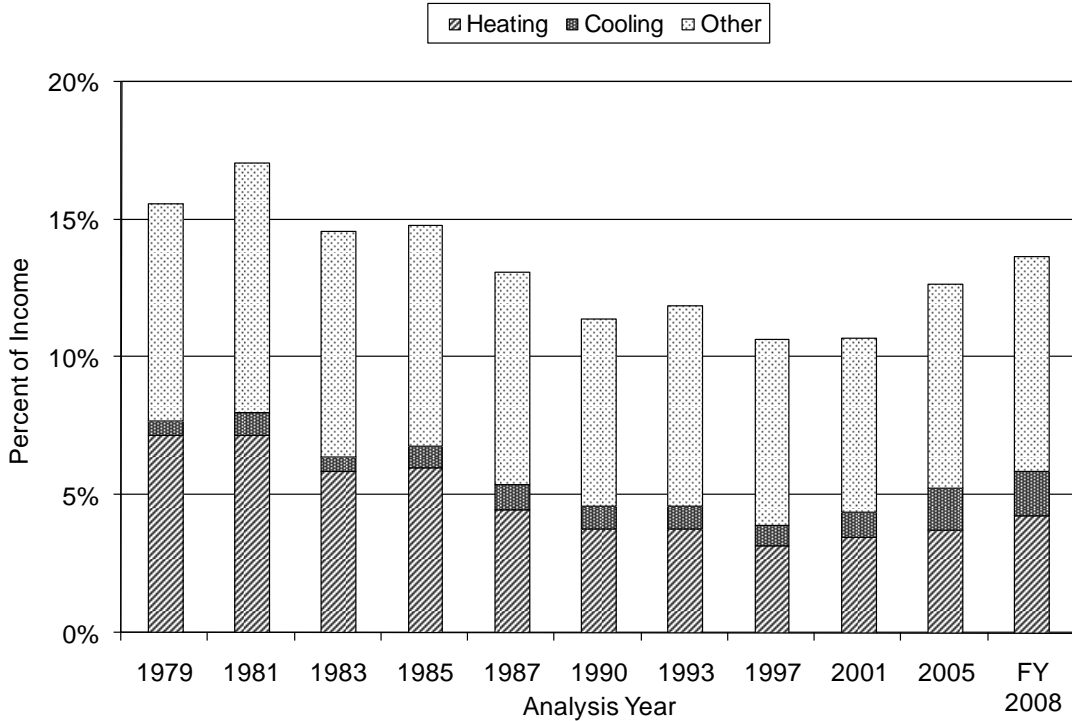
Figure 7. Mean residential energy expenditures for low income households, 1979 to FY 2008



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 5.9 percent in FY 2008; this represented a decline of 1.8 percentage points.<sup>6</sup> The decline in mean group residential energy burden from 1979 to FY 2008 was 1.9 percentage points (from 15.6 percent to 13.7 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).

<sup>6</sup> 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 2008**



### 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 2005 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 2008, fuel prices increased again. FY 2008 fuel prices were almost 20 percent higher than 2005 fuel prices. The increases in fuel prices from 2005 through FY 2008 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 2008

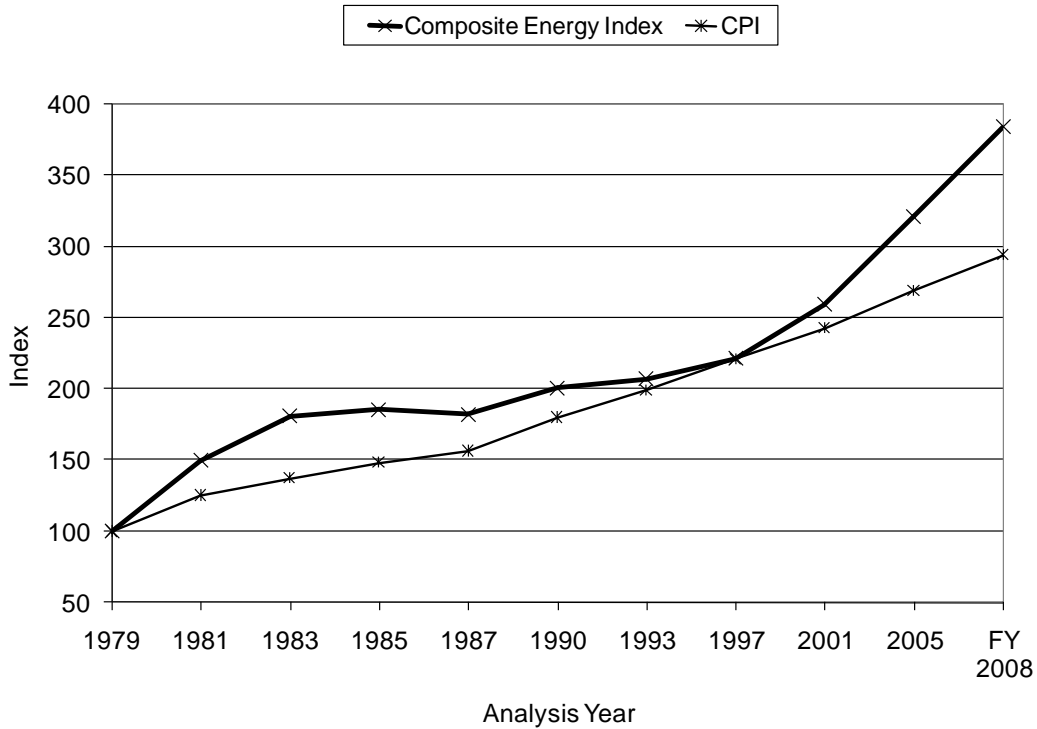
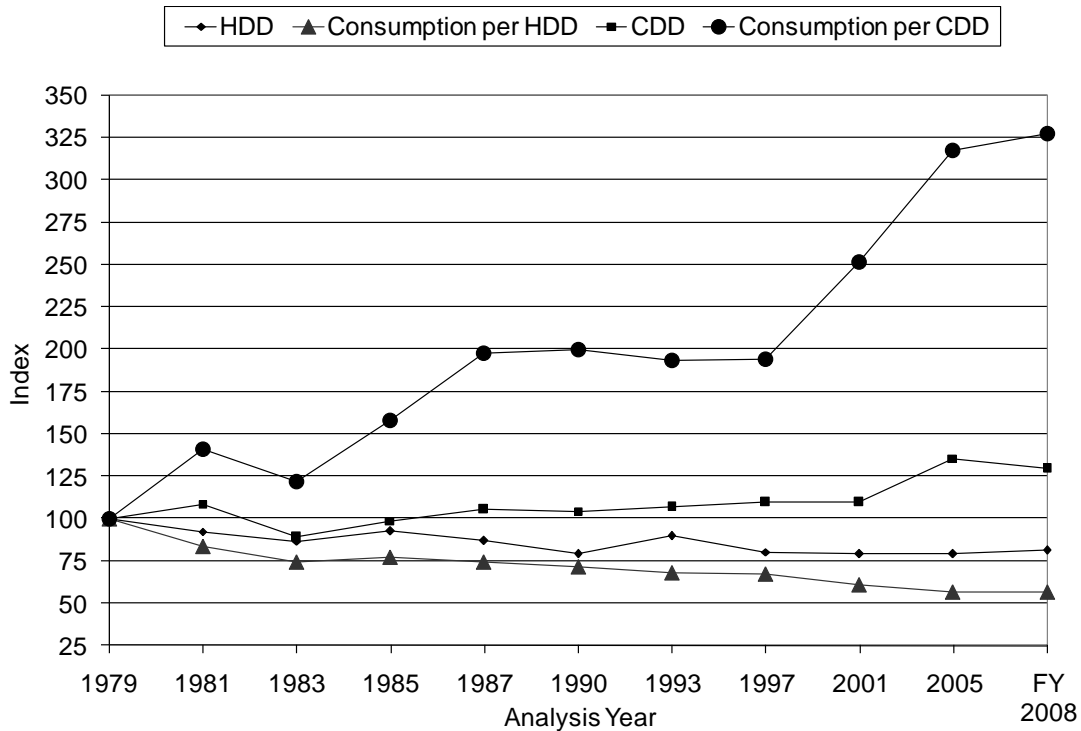


Figure 10 shows average energy consumption for heating and cooling compared to heating and cooling degree days from 1979 to FY 2008 for low income households. As shown, heating consumption per heating degree day generally declined from 1979 to FY 2008 probably at least in large part due to energy conservation efforts. In contrast, cooling consumption per cooling degree day rose sharply through FY 2008 because of a large increase in the availability of air-conditioning to low income households.<sup>7</sup> Only 37 percent of low income households had air-conditioning equipment in 1979, but by 2005 the number had risen to 80 percent.

<sup>7</sup>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 2008



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 of 7.7 percent for low income households was just over four times higher than the 1.9 percent burden for all households. In FY 2008, the mean group home energy burden for all households was 1.3 percent. That year, the mean group home energy burden for low income households was 5.9 percent, again over four times higher than that for all households.

## Trends in LIHEAP

Between 1981 and FY 2008, as shown in Figure 11, the number of income eligible households has risen 70 percent, during which time Federal fuel assistance funds have increased by 32.7 percent.<sup>8</sup> Also during this period, the percentage of income eligible households receiving heating and/or winter crisis assistance has declined from 36 percent in 1981 to 16 percent in FY 2008 – though this figure has remained steady since 1997.<sup>9</sup> 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, and then rose by 19 percent in FY 2008. Cooling benefits per household actually fell until 1985 and increased sharply from 1993 through 2001, and then fell by over 6 percent in 2005 and almost 13 percent in FY 2008. After adjusting for inflation, the mean value of combined Federal heating and winter crisis benefits fell (in

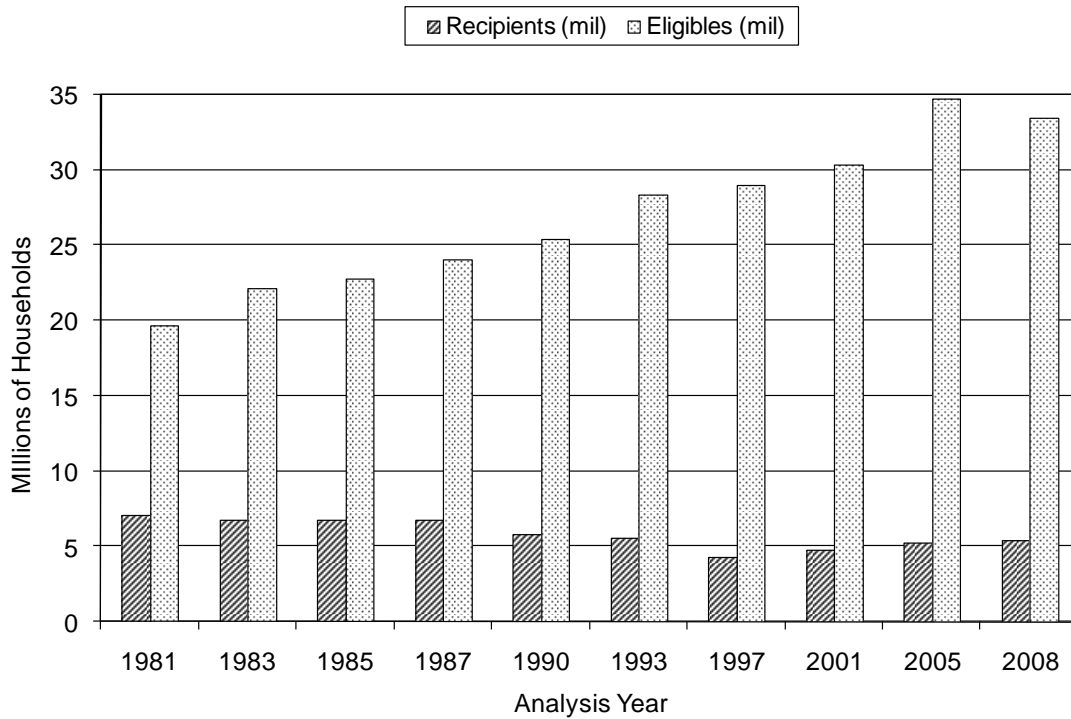
<sup>8</sup> Income eligible household estimates do not include those households with incomes greater than the statutory income standards but who may still qualify for LIHEAP benefits because they are categorically eligible for LIHEAP under section 8624 (b)(2)(A) of the LIHEAP statute.

<sup>9</sup> Note that the Federal income eligibility guidelines for the FY 1981 Low Income Energy Assistance Program (LIEAP) were different from those for subsequent LIHEAP programs.

1981 dollars) from \$213 in 1981 to \$151 in FY 2008. Cooling benefits fell (in 1981 dollars) from \$129 in 1981 to \$72 in FY 2008.

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 10 percent in FY 2008. The decrease resulted from the combination of higher home heating bills and a smaller per-household amount of assistance benefits.

**Figure 11. Number of LIEAP/LIHEAP income eligible and heating and/or winter crisis assistance recipient households, FY 1981 to FY 2008**



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 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 2008, 16 percent of federally income eligible households received assistance with their heating costs.<sup>10</sup> 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.

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

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

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<sup>10</sup> For FY 2008, States were not required to report an unduplicated count of assisted households that receive LIHEAP assistance regardless of the type(s) of assistance provided to recipient households. Therefore this percentage does not provide a complete picture to those household that may have received other types of LHEAP assistance. Additionally, 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.

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.

## **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.<sup>11</sup>
- 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.<sup>12</sup>

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**

ACF's *Final FY 2010 Annual Performance Plan and FY 2008 Annual Performance Report* furnished measurements of targeting performance. The performance report showed the LIHEAP targets and performance results for FY 2008.

# **LIHEAP Energy Insecurity Study**

OCS funded a special set of questions for low income households responding to the 2005 RECS. Those questions collected information on residential and home energy-related problems faced by low income households. This section of the Executive Summary presents information on a study commissioned by OCS to conduct an exploratory analysis of the 2005 RECS data.<sup>13</sup>

## **Study Goals**

The purpose of the study was to conduct an exploratory analysis of the 2005 RECS data to develop a better understanding of the performance of the survey questions and to develop new information on the Energy Insecurity<sup>14</sup> of low income households, including:

- Levels and Types of Energy Insecurity – Estimation of the rate at which low income households face various types of energy problems

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<sup>11</sup> *LIHEAP Targeting Performance Measurement Statistics: GPRA Validation of Estimation Procedures*, August 2004, Report prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.

<sup>12</sup> *LIHEAP Energy Burden Evaluation Study*, March 2005, Report prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.

<sup>13</sup> *LIHEAP Special Study of the 2005 Residential Energy Consumption Survey – Dimensions of Energy Insecurity for Low Income Households*, February 2010, prepared by APPRISE Incorporated under contract #DE-AM01-04EI41006.

<sup>14</sup> In the literature, Energy Insecurity is defined as the “lack of consistent access to enough of the kinds of energy needed for a healthy and safe life in the geographic area where a household is located.” (Cook et al., *A Brief Indicator of Energy Security: Associations with Food Security, Child Health, and Child Development in US Infants and Toddlers. Pediatrics*; Oct 2008, 122; e867-e875.)

- Factors Related to Energy Insecurity – An analysis of the factors associated with energy problems
- Performance of the Home Energy Insecurity Scale – An assessment of the performance of the Home Energy Insecurity Scale in measuring the impacts of energy costs on low income households

## **Levels and Types of Energy Insecurity**

Prior to 2005, RECS questions on energy affordability issues were limited to heating and electric service disconnections. The 2005 RECS included a broader set of questions that documented the different types of energy affordability problems that low income households face.

### **Space Heating Disruptions**

One problem that some low income households face when they are unable to pay their energy bills is that they go without energy service and are unable to heat their homes with their main heating equipment when heat is needed.

Table 1 presents data from the 2005 RECS on space heating disruptions for low income households. The table shows the number and percent of low income households that experienced each type of space heating disruption. Table 1 shows that almost 1.6 million low income households had a space heating disruption because of the inability to pay for the repair of a broken heating system, and such disruptions affected 4.4 percent of the entire population of low income households.

**Table 1. Inability to use the main source of heat when heat is needed in the past 12 months for low income households, 2005**

<b>Reason for Space Heating Disruption</b>	<b>Number of Low Income Households with Space Heating Disruption</b>	<b>Percent of All Low Income Households</b>
Inability to pay for the repair of broken heating system	1,581,233	4.4%
Inability to pay for bulk fuel delivery	300,284	0.8%
Inability to pay for electric service	1,671,636	4.7%
Inability to pay for natural gas service	621,956	1.7%
Disruption due to any reason	3,265,563	9.1%

Source: 2005 RECS

### **Air Conditioning Disruptions**

Another problem that some low income households face when they are unable to pay their energy bills is that they go without electric service and are unable to cool their homes with their air conditioning equipment when cooling is needed.

Table 2 presents data on air conditioning disruptions for low income households. It shows that over 1.2 million low income households had an air conditioning disruption because of the inability to pay for electric service, and such disruptions affected 3.5 percent of the entire population of low income households.

**Table 2. Inability to use air conditioning when cooling is needed in the past 12 months for low income households, 2005**

<b>Reason for Air Conditioning Disruption</b>	<b>Number of Low Income Households with Air Conditioning Disruption</b>	<b>Percent of All Low Income Households</b>
Inability to pay for the repair of broken heating system	1,427,509	4.0%
Inability to pay for electric service	1,240,278	3.5%
Disruption due to any reason	2,507,547	7.0%

Source: 2005 RECS

**Financial Dimensions of Energy Insecurity**

In addition to space heating and air conditioning disruptions, the 2005 RECS asked low income survey respondents questions related to the financial dimensions of Energy Insecurity.

Table 3 presents information on the financial elements of Energy Insecurity for low income households. For each type of financial insecurity, the table shows the percent of low income households that experienced that type of financial Energy Insecurity. The last row of Table 3 shows that 23.6 percent of low income households experienced at least one type of financial insecurity “almost every month” during the past 12 months. While 42.2 percent had no financial insecurity, 57.8 percent of low income households experienced at least one type of financial insecurity during the past 12 months. The most common types of financial insecurity are “worry about ability to pay” and “reduce spending for basic necessities.” Over half of low income households indicated that they experienced one or both of those insecurities at least once during 2005.

**Table 3. Financial Energy Insecurity in the past 12 months for low income households, 2005**

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

Source: 2005 RECS

It is clear that the heating and cooling disruption statistics understate the level of Energy Insecurity among low income households. While about 10 percent of households experience space heating disruptions, almost half of households reduce spending for basic necessities and over 20 percent of households have threats of service termination.

**Health and Safety Dimensions of Energy Insecurity**

The 2005 RECS also asked low income survey respondents questions related to the health and safety dimensions of Energy Insecurity.

Table 4 presents information on the health and safety elements of Energy Insecurity for low income households. The last row of Table 4 shows that 6.3 percent of low income households experienced at least one type of health and safety insecurity “almost every month” during the past 12 months. While 74.0 percent had no health and safety insecurity, 26.0 percent of low income households experienced at least one type of health and safety insecurity during the past 12 months. The most commonly reported type of Energy Insecurity is “closing off part of home.” However, for each of the listed types of Energy Insecurity, close to 10 percent of low income households report experiencing that problem.

**Table 4. Health and Safety Energy Insecurity in the past 12 months for low income households, 2005**

<b>Dimension</b>	<b>Almost Every Month</b>	<b>Some Months</b>	<b>1 or 2 Months</b>	<b>Never</b>
Close off part of home	4.6%	6.4%	2.4%	86.6%
Keep home at unsafe temperature	1.8%	4.1%	2.5%	91.6%
Leave home for part of the day	1.0%	4.2%	3.6%	91.2%
Use stove or oven for heat	0.7%	4.9%	4.5%	89.9%
Any health or safety insecurity	6.3%	12.4%	7.3%	74.0%

Source: 2005 RECS

## **Factors Related to Energy Insecurity**

The exploratory study examined how energy-related problems varied geographically and demographically and found that the factors most associated with differences in the incidence rates for energy-related problems were Census Region, Poverty Level, Vulnerability Group, and Residential Energy Group.

### ▪ **Census Region**

- *Heating and Cooling Service Interruptions* – Low income households in the South and West Census regions experience service interruptions when heat or cooling is needed at almost twice the rate of low income households in the Northeast and Midwest.
- *Financial Energy Insecurity* – About half of low income households in the Midwest, South, and West regions reported that they had to reduce spending for household necessities because of the cost of residential energy, compared to about 40 percent of households in the Northeast. Multivariate analysis, however, showed that low income households in different Census regions were likely to experience similar rates of financial insecurity after controlling for vulnerability group, poverty level, residential energy burden, and whether the household uses bulk fuel.
- *Health and Safety Energy Insecurity* – Low income households in the Northeast region were less likely to report that they had to keep their home at a temperature that they felt was unsafe or unhealthy because of the cost of residential energy; 5.7 percent of households in the Northeast reported unhealthy or unsafe temperatures, compared to 10.1 percent in the South region.

### ▪ **Poverty Level**



- *Service Disruptions* –Households with income at or below 100 percent of the HHS poverty guidelines experience service interruptions at a higher rate than households with income above 100 percent of the poverty guidelines.
  - *Financial Energy Insecurity* – About 52.7 percent of the households with income at or below 100 percent of the poverty guidelines reported that they had to reduce spending for household necessities because of the cost of residential energy, compared to 37.9 percent of low income households with incomes above 150 percent of the poverty guidelines.
  - *Health and Safety Energy Insecurity* – About 12.1 percent of households with income at or below 100 percent of the poverty guidelines reported that they had to keep their home at a temperature that they felt was unsafe or unhealthy because of the cost of residential energy, compared to 4.4 percent of the low income households with income above 150 percent of the poverty guidelines.
- **Vulnerability Group**
- *Heating and Cooling Service Interruptions* – Elderly households with income at or below 100 percent of the poverty guidelines have a lower rate of service interruptions than other types of households with income at or below 100 percent of the poverty guidelines.
  - *Financial Energy Insecurity* – The share of elderly households with income at or below 100 percent of the poverty guidelines that reported that they had to reduce spending for household necessities because of the cost of residential energy was similar to that of young child households and other types of households with income at or below 100 percent of the poverty guidelines.
  - *Health and Safety Energy Insecurity* – The share of elderly households with income at or below 100 percent of the poverty guidelines that reported that they had to keep their home at a temperature that they felt was unsafe or unhealthy because of the cost of residential energy was similar to that of young child households and other types of households with income at or below 100 percent of the poverty guidelines.

Multivariate analysis, however, showed that elderly low income households experience lower levels of all types of Energy Insecurity after controlling for Census region, poverty level, residential energy burden, and whether the household uses bulk fuel.

▪ **Energy Burden Group**

- *Heating and Cooling Service Interruptions* – Low income households with high residential energy burden<sup>15</sup> experience service interruptions at a higher rate than low income households with low residential energy burden.

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<sup>15</sup> 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. 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. The 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. For more information, the reader can refer to “LIHEAP Energy Burden Evaluation Study,” available on OCS’ LIHEAP website at: [http://www.acf.hhs.gov/programs/ocs/liheap/program\\_stats/study-July\\_05.doc](http://www.acf.hhs.gov/programs/ocs/liheap/program_stats/study-July_05.doc).

- *Financial Energy Insecurity* – High residential energy burden households were more likely to report that they had to reduce spending for household necessities because of the cost of residential energy than low residential energy burden households.
- *Health and Safety Energy Insecurity* – High residential energy burden households were more likely to report that they had to keep their home at a temperature that they felt was unsafe or unhealthy because of the cost of residential energy than low residential energy burden households.<sup>16</sup>

## **Home Energy Insecurity Scale**

Colton originally developed the Home Energy Insecurity Scale in 2003 for OCS as a tool to describe the home energy status of LIHEAP income-eligible households.<sup>17</sup> The Scale combines information obtained from various Energy Insecurity questions into a single measure that can characterize the energy needs of low income households. Based on responses to these questions, households are placed in one of the five thresholds: thriving, capable, stable, vulnerable, and in-crisis.

The study examined how Energy Insecurity as measured by the Home Energy Insecurity Scale varied by region and by demographic group. In general, the findings from the analysis of the Home Energy Insecurity Scale were consistent with the findings from the tabular analysis. The main benefit of the Scale is that it offers a way to examine all of the energy-related problems at one time. As such, the Home Energy Insecurity Scale could be used as an outcome performance measure for LIHEAP.

One issue for the 2005 RECS Home Energy Insecurity Scale is that most low income households are categorized as *thriving*, *vulnerable*, or *in-crisis*, while very few are categorized in the *capable* and *stable* categories. If so few households are categorized as *capable* or *stable*, it raises questions as to whether either is a meaningful way to characterize the Energy Insecurity of households. The study investigated this question by reviewing the Energy Insecurity questions and examining the sensitivity of household status to minor changes in the categorization procedures.

The study investigated the underlying factors that place households in *vulnerable* and *in-crisis* status on the Scale and tested the impact of revising the classification of households based on the responses to some of the Scale's questions. The study showed that a modified classification of households on the Scale is more consistent with the Scale's threshold definitions.

The findings from the analysis suggest that, if OCS decides to use the Home Energy Insecurity Scale as an outcome performance measure, additional analysis of the Scale should be conducted to ensure that the Scale is meaningful in terms of its classification of the energy needs of low income households. These findings are consistent with the study recommendations of Colton (2003).

## **Study Implications**

The 2005 RECS included a set of questions that documented the different types of energy affordability problems that low income households face. This study used the 2005 RECS data to develop information on the Energy Insecurity of low income households.

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<sup>16</sup> The study showed that there was no relationship between energy burden and Energy Insecurity if home energy burden instead of residential energy burden was used in the analysis.

<sup>17</sup> Colton, R. (2003). "Measuring the Outcomes of Low-Income Energy Assistance Programs through a Home Energy Insecurity Scale." A publication prepared for: LIHEAP Committee on Managing for Results. U.S. Department of Health and Human Services. Administration for Children and Families. Office of Community Services, Division of Energy Assistance.

### **Types and Levels of Energy Insecurity**

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

- *Heating and Cooling Service Interruptions* - Tracking the levels of home heating and cooling service interruptions continues to be an important purpose of the RECS. The time series of RECS data shows that the 2005 space heating interruption rate was the highest measured since the question was added to the RECS in 1984.
- *Financial Energy Insecurity* – The inclusion of questions that document financial Energy Insecurity for low income households provides a much better understanding of the extent to which energy costs affect low income households; the statistics show that almost 60 percent of low income households face financial Energy Insecurity and that almost one-fourth of those households face financial Energy Insecurity “almost every month.”
- *Health and Safety Energy Insecurity* – The inclusion of questions that document health and safety Energy Insecurity for low income households gives additional information on the other ways that energy affordability problems can affect low income households. Overall, about one-fourth of low income households experienced health and safety Energy Insecurity.

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

### **Home Energy Insecurity Scale**

The 2005 RECS furnishes the first opportunity to estimate Energy Insecurity for all low income households. This study furnishes the following three important findings with respect to the Scale and its uses:

1. *LIHEAP Targeting* – The Home Energy Insecurity Scale allows for LIHEAP program managers to see what groups of households are at greater risk for problems resulting from energy unaffordability. By targeting such households, program managers may be able to increase the effectiveness of LIHEAP.
2. *Performance Measurement* – It is clear that some low income households have a higher level of Energy Insecurity than others. It may be appropriate for LIHEAP to use the reduction in Energy Insecurity as an outcome performance measure for LIHEAP.
3. *Study and Analysis* – However, there are some important questions about the Home Energy Insecurity Scale. In particular, it is important to measure how the different levels of Home Energy Insecurity relate to the long term health and well-being of low income households. For that reason, it would be appropriate for OCS to continue to study the Home Energy Insecurity Scale and its policy implications.

The 2005 RECS furnishes a rich database of information on the energy needs of low income households. By supplementing heat disruption questions with questions on the broader range of energy problems, the survey has given policymakers much better information on the impacts of energy affordability.

# 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 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, 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. Reauthorization of LIHEAP 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 2008 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), 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 publications *Monthly Energy Review* and *Petroleum Marketing Monthly*.
- 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: DEA's administrative data from the *LIHEAP Household Report* and the *LIHEAP Grantee Survey*.

## **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 2008. 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 2008. 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 – LIHEAP Energy Insecurity Study. This section presents the results of the special study commissioned by OCS to conduct an exploratory analysis of the 2005 RECS data to develop a better understanding of the performance of the survey questions and to develop new information on the Energy Insecurity of low income households.
- Appendix A documents the procedures used to prepare the FY 2008 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 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 2005 RECS, which has energy consumption and expenditures data for calendar year 2005. For this *Notebook*, the 2005 space heating and cooling consumption and expenditures have been adjusted to reflect FY 2008 weather and fuel prices, as described in Appendix A. Therefore, any residential energy or home energy consumption and expenditure data presented in this section for years after 2005 have been adjusted from the 2005 RECS.

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

Table 2-1, 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.<sup>18</sup> In FY 2008, average residential energy consumption for all households was 96.3 million British Thermal Units (mmBTUs) and average expenditures were \$2,172. The mean individual residential energy burden for all households was 7.4 percent of income.

Low income households had average residential energy consumption of 84.9 mmBTUs (11.8 percent less than all households) and average energy expenditures of \$1,883 (13.3 percent less than all households). Their mean individual residential energy burden was 14.1 percent, almost twice that for all households and almost four times that for non low income households.

Average residential energy expenditures for LIHEAP recipient households were \$2,104, almost 12 percent higher than that for all low income households. The mean individual residential energy burden was 16.8 percent, 2.7 percentage points higher than that for low income households.

Nationally, all households increased their average residential energy expenditures by over 9 percent, from \$1,986 in FY 2007 to \$2,172 in FY 2008. Low income households increased theirs by almost 10 percent, from \$1,715 in FY 2007 to \$1,883 in FY 2008. LIHEAP recipient households increased theirs by almost 11 percent, from \$1,900 in FY 2007 to \$2,104 in FY 2008. The rise in expenditures is due to a significant rise in fuel prices.

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 2008, home heating was 32 percent of the residential energy bill for low income households, and home cooling made up 11 percent.

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<sup>18</sup>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's poverty guidelines or 60 percent of State median income. Low income households represent those households with annual incomes under the LIHEAP income maximum of the greater of 150 percent of HHS's poverty guidelines or 60 percent of State median income. LIHEAP recipient households represent those low income households that received Federal fuel assistance.

**LIHEAP Home Energy Notebook for FY 2008: II. Home Energy Data**

**Table 2-1. Residential energy: Average annual household consumption, expenditures, and burden by all, non low income, low income, and LIHEAP recipient households, by main heating fuel type, United States, FY 2008<sup>1/</sup> (See also Tables A-3a – A-3c, Appendix A)**

Main heating fuel	Fuel consumption (mmBTUs) <sup>2/</sup>	Fuel expenditures	Mean individual burden <sup>3/</sup>	Median individual burden <sup>4/</sup>	Mean group burden <sup>5/</sup>
<i>All households</i>					
All fuels	96.3	\$2,172	7.4%	4.4%	3.2%
Natural gas	112.3	\$2,074	6.3%	4.0%	3.1%
Electricity	61.2	\$1,811	7.1%	4.0%	2.7%
Fuel oil	146.9	\$4,127	14.6%	8.6%	6.1%
Kerosene	53.5	\$1,583	10.4%	7.8%	2.3%
LPG <sup>6/</sup>	107.5	\$3,003	10.1%	6.8%	4.4%
<i>Non low income households</i>					
All fuels	102.5	\$2,328	3.7%	3.2%	2.6%
Natural gas	117.0	\$2,228	3.4%	3.0%	2.5%
Electricity	65.9	\$1,952	3.3%	2.9%	2.2%
Fuel oil	155.9	\$4,414	6.7%	6.0%	5.0%
Kerosene	60.5*	\$1,634*	4.8%	5.0%	1.9%
LPG <sup>6/</sup>	115.3	\$3,141	5.4%	5.0%	3.6%
<i>Low income households</i>					
All fuels	84.9	\$1,883	14.1%	9.7%	10.8%
Natural gas	102.4	\$1,748	12.4%	8.9%	10.0%
Electricity	53.2	\$1,572	13.4%	8.4%	9.0%
Fuel oil	132.9	\$3,686	26.7%	20.2%	21.2%
Kerosene	52.2	\$1,574	11.4%	9.2%	9.0%
LPG <sup>6/</sup>	92.9	\$2,743	18.8%	14.8%	15.8%
<i>LIHEAP recipient households</i>					
All fuels	103.8	\$2,104	16.8%	10.9%	14.4%
Natural gas	114.2	\$1,874	14.8%	10.6%	12.8%
Electricity	49.2	\$1,284	15.1%	9.3%	8.8%
Fuel oil	150.2	\$4,178	29.4%	29.6%	28.6%
Kerosene	74.3*	\$1,790*	18.9%	15.4%	12.3%
LPG <sup>6/</sup>	105.7	\$3,303	18.3%	12.0%	22.6%

<sup>1/</sup>Data are derived from the 2005 RECS, adjusted to reflect FY 2008 heating degree days, cooling degree days, and fuel prices. Data represent residential energy used from October 2007 through September 2008.

<sup>2/</sup>A British Thermal Unit (BTU) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MmBTUs or mmBTUs refer to values in millions of BTUs.

<sup>3/</sup>Mean individual burden is calculated by taking the mean, or average, of individual energy burdens, as calculated from FY 2008 adjusted RECS data. See Appendix A for information on calculation of energy burden.

<sup>4/</sup>Median individual burden is calculated by taking the median of individual energy burdens, as calculated from FY 2008 adjusted RECS data.

<sup>5/</sup>Mean group energy burden has been calculated by (1) calculating average residential energy expenditures from the 2005 RECS for each group of households; (2) adjusting those figures for FY 2008; and (3) dividing the adjusted figures by the average income for each group of households from the 2008 CPS ASEC.

<sup>6/</sup>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 40 percent of their annual residential expenditures for space heating, 8 percentage points more than did the average low income household. LIHEAP recipient households spent 7 percent for space cooling, about 64 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 2008**

End Use	All households	Non low income households	Low income households	LIHEAP recipient households
Space heating	30%	28%	32%	40%
Space cooling	12%	13%	11%	7%
Water heating	15%	15%	16%	16%
Refrigeration	8%	8%	8%	7%
Appliances	35%	36%	33%	30%
All uses	100%	100%	100%	100%

## 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 2005, about half of the households in each income group used natural gas as their main heating fuel. LIHEAP recipient households used natural gas at the highest rate, 60.0 percent. Almost 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, 31.8 percent, and LIHEAP recipient households used electricity at the lowest rate, 19.0 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, April 2005<sup>1/</sup> (See also Table A-4, Appendix A)**

Heating fuel	All households	Non low income households	Low income households	LIHEAP recipient households
Natural gas	52.6%	55.0%	48.1%	60.0%
Electricity	30.1%	29.2%	31.8%	19.0%
Fuel oil	6.9%	6.5%	7.8%	12.0%
Kerosene	0.6%	0.1%	1.5%	2.4%
LPG	5.5%	5.5%	5.4%	5.2%
Other <sup>2/</sup>	3.2%	2.9%	3.7%	1.2%

<sup>1/</sup>Data are derived from the 2005 RECS. Percentages may not add to 100 percent due to rounding.

<sup>2/</sup>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 24.1 percent of households in September 1990 to 29.2 percent in April 2005.<sup>19</sup> Low income households increased their use of electricity as the main heat source from 20.0 percent in September 1990 to 31.8 percent in April 2005. LIHEAP recipient households' use of electricity as their main heat source rose from 14.4 percent in September 1990 to 19.0 percent in April 2005.

### **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 Table 2-4. In FY 2008, average home heating consumption for all households was 39.6 mmBTUs, average expenditures were \$640, and mean individual home heating burden was 2.4 percent.

Low income households had average home heating consumption of 37.5 mmBTUs (5.3 percent less than the average for all households) and average home heating expenditures of \$611 (4.5 percent less than the average for all households). The mean individual home heating burden for low income households was 4.8 percent, twice as much as the average home heating burden for all households and more than four times the average home heating burden for non low income households.

Average home heating consumption for LIHEAP recipient households was 53.7 mmBTUs (36 percent higher than the average for all households), and average home heating expenditures were \$839 (about 31 percent higher than the average for all households). Mean individual home heating burden for LIHEAP households was 7.1 percent, 2.3 percentage points higher than the average for low income households and close to three times the average for all households. Average home heating consumption for LIHEAP recipient households was 43 percent greater than that for all low income households, because LIHEAP heating assistance recipient households tend to live in colder climate regions.<sup>20</sup>

For FY 2008, the heating season was slightly colder than the FY 2007 heating season. Between FY 2007 and FY 2008, home heating consumption increased by 1.8 percent for all households, 1.6 percent for low income households, and 1.5 percent for LIHEAP recipient households.

Compared to FY 2007, the FY 2008 prices for natural gas increased by 4.4 percent, fuel oil prices increased by 21.9 percent, and electricity prices increased by 6.3 percent in nominal terms.<sup>21</sup> Average home heating expenditures for all households, low income households, and LIHEAP recipient households increased as a result of large rises in fuel prices and a small increase in consumption due to a slightly colder heating season during this period.

The increases in home heating expenditures from FY 2007 to FY 2008 varied across the three major home heating fuels. Expenditures for households heating with natural gas increased by 7 percent. Expenditures for households heating with electricity increased by almost 6 percent, while expenditures for households heating with fuel oil increased by almost 41 percent.

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<sup>19</sup>Findings from the 2005 RECS, Energy Information Administration, U.S. Department of Energy.

<sup>20</sup>LIHEAP Home Energy Notebook for FY 2006.

<sup>21</sup>Price data obtained from the Energy Information Administration's Monthly Energy Review, March 2009, for all fuels.

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**Table 2-4. Home heating: Average annual household consumption, expenditures, and burden by all, non low income, low income, and LIHEAP recipient households, by fuel type, United States, FY 2008<sup>1/</sup> (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)**

Main heating fuel	Fuel consumption (mmBTUs) <sup>2/</sup>	Fuel expenditures	Mean individual burden <sup>3/</sup>	Median individual burden <sup>4/</sup>	Mean group burden <sup>5/</sup>
<i>All households</i>					
All fuels	39.6	\$640	2.4%	0.9%	0.9%
Natural gas	51.6	\$601	2.2%	1.1%	0.9%
Electricity	8.4	\$257	1.1%	0.5%	0.4%
Fuel oil	96.4	\$2,342	9.3%	5.1%	3.5%
Kerosene	20.0	\$465	2.7%	2.2%	0.7%
LPG <sup>6/</sup>	51.4	\$1,341	4.5%	2.9%	2.0%
<i>Non low income households</i>					
All fuels	40.7	\$656	1.1%	0.6%	0.7%
Natural gas	51.1	\$600	1.0%	0.7%	0.7%
Electricity	8.8	\$270	0.5%	0.3%	0.3%
Fuel oil	100.1	\$2,438	3.9%	3.2%	2.8%
Kerosene	24.9*	\$569*	1.9%	1.2%	0.6%
LPG <sup>6/</sup>	57.4	\$1,451	2.5%	2.1%	1.7%
<i>Low income households</i>					
All fuels	37.5	\$611	4.8%	2.2%	3.5%
Natural gas	52.7	\$602	4.6%	2.9%	3.5%
Electricity	7.7	\$235	2.1%	1.2%	1.3%
Fuel oil	90.8	\$2,195	17.7%	12.1%	12.6%
Kerosene	19.1	\$446	2.9%	2.2%	2.6%
LPG <sup>6/</sup>	39.9	\$1,134	8.3%	5.8%	6.5%
<i>LIHEAP recipient households</i>					
All fuels	53.7	\$839	7.1%	3.6%	5.7%
Natural gas	62.7	\$720	6.6%	3.6%	4.9%
Electricity	8.6	\$249	3.5%	1.6%	1.7%
Fuel oil	97.0	\$2,347	16.5%	13.5%	16.1%
Kerosene	22.1*	\$489*	4.2%	5.7%	3.3%
LPG <sup>6/</sup>	43.3	\$1,231	7.8%	5.2%	8.4%

<sup>1/</sup>Data are derived from the 2005 RECS, adjusted to reflect FY 2008 heating degree days and fuel prices. Data represent home energy used from October 2007 through September 2008.

<sup>2/</sup>A British Thermal Unit (BTU) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MmBTUs or mmBTUs refer to values in millions of BTUs.

<sup>3/</sup>Mean individual burden is calculated by taking the mean, or average, of individual heating energy burdens, as calculated from FY 2008 adjusted RECS data. See Appendix A for information on energy burden calculation.

<sup>4/</sup>Median individual burden is calculated by taking the median of individual heating energy burdens, as calculated from FY 2008 adjusted RECS data.

<sup>5/</sup>Mean group heating energy burden has been calculated by (1) calculating average home heating energy expenditures from the 2005 RECS for each group of households; (2) adjusting those figures for FY 2008; and (3) dividing the adjusted figures by the average income for each group of households from the 2008 CPS ASEC.

<sup>6/</sup>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 92 percent of households in 2005 cooled their homes in ways defined by the 2005 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, April 2005<sup>1/</sup> (See also Table A-7, Appendix A)**

Presence of Cooling	All Households	Non low income households	Low income households	LIHEAP recipient households
Cooling <sup>2/</sup>	92%	94%	89%	86%
None <sup>3/</sup>	8%	6%	11%	15%

<sup>1/</sup>Data are derived from the 2005 RECS.

<sup>2/</sup>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).

<sup>3/</sup>Represents households that do not cool or cool in ways other than those defined by the 2005 RECS (e.g., 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 2008, average home cooling consumption for households that cooled was 8.6 mmBTUs, average expenditures were \$289, and mean individual home cooling burden was 1.1 percent.

For households that cooled, low income households had average home cooling energy consumption of 6.9 mmBTUs (almost 20 percent less than the average for all households) and average home cooling expenditures of \$234 (about 19 percent less than the average for all households). The mean individual home cooling burden for low income households was 2.2 percent, twice the average home cooling burden of all households and more than four times that of non low income households.

For households that cooled, average home cooling consumption for LIHEAP recipient households was 4.8 mmBTUs (about 44 percent less than all households), and average home cooling expenditures were \$165 (43 percent less than all households). Mean individual home cooling burden for LIHEAP recipient households was 1.3 percent, 1.18 times the average for all households. On average, LIHEAP recipient households consumed over 30 percent fewer BTUs for cooling than did all low income households.

The FY 2008 cooling season was slightly cooler than FY 2007. From FY 2007 to FY 2008, home cooling consumption decreased by 1.1 percent for all households, by 1.4 percent for low income households, and by 5.9 percent for LIHEAP recipient households.

Nationally, average home cooling expenditures for all households and low income households increased by about 5 percent. Average home cooling expenditures for LIHEAP recipient households

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increased by almost 2 percent. The changes in expenditures resulted from the combination of a moderate rise in electricity prices from FY 2007 to FY 2008 and slightly cooler weather during that period.

**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 2008<sup>1/</sup> (See also Table A-7, Appendix A)**

Household group	Fuel consumption (mmBTUs) <sup>2/</sup>	Fuel expenditures	Mean individual burden <sup>3/</sup>	Median individual burden <sup>4/</sup>	Mean group burden <sup>5/</sup>
All households	8.6	\$289	1.1%	0.4%	0.4%
Non low income households	9.4	\$318	0.5%	0.3%	0.4%
Low income households	6.9	\$234	2.2%	0.8%	1.3%
LIHEAP recipient households	4.8	\$165	1.3%	0.5%	1.1%

<sup>1/</sup>Data are derived from the 2005 RECS, adjusted to reflect FY 2008 cooling degree days and fuel prices. Data represent residential energy used from October 2007 through September 2008.

<sup>2/</sup>A British Thermal Unit (BTU) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MmBTUs or mmBTUs refer to values in millions of BTUs.

<sup>3/</sup>Mean individual burden is calculated by taking the mean, or average, of individual cooling energy burdens, as calculated from FY 2008 adjusted RECS data. See Appendix A for information on energy burden calculation.

<sup>4/</sup>Median individual burden is calculated by taking the median of individual cooling energy burdens, as calculated from FY 2008 adjusted RECS data.

<sup>5/</sup> Mean group cooling energy burden has been calculated by (1) calculating average home cooling energy expenditures from the 2005 RECS for each group of households; (2) adjusting those figures for FY 2008; and (3) dividing the adjusted figures by the average income for each group of households from the 2008 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 2008 CPS ASEC, the definition based solely on 150 percent of HHS’ poverty guidelines excludes 10 million households of the 33.5 million households that meet the definition of LIHEAP income eligible households. Therefore, differences in FY 2008 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.”<sup>22</sup>

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.

**Table 3-1. Definition of special terms**

Term	Definition
Billing data	Energy cost and consumption data furnished by the household's fuel supplier.
Composite price	The weighted average price of electricity, natural gas, and fuel oil used for residential purposes.
Real dollar expenditures	Costs adjusted for changes in the price of a market basket of consumer goods between two years (i.e., adjusted for inflation or deflation).
Cooling degree days	Daily cooling degree days are computed by subtracting a base temperature (65 degrees Fahrenheit) from a day's mean temperature when it exceeds 65 degrees Fahrenheit. If the mean temperature on a day is 70, the number of cooling degree days experienced on that day is 5 (70 minus 65). In this <i>Notebook</i> , we refer to annual cooling degree days, or the sum of all cooling degree days experienced during a year.
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. <sup>1/</sup>
Energy end uses	The specific use of energy in the home for home heating, home cooling or ventilation, water heating, and appliances.
Fuel assistance	LIHEAP heating, cooling, and crisis assistance.
Heating degree days	Daily heating degree days are computed by subtracting the mean temperature for a day, when that temperature falls below 65 degrees Fahrenheit, from a base temperature (65 degrees Fahrenheit). For example, if the mean temperature on a day is 60 and the base temperature is 65, the number of heating degree days experienced on that day is 5 (65 minus 60). In this <i>Notebook</i> , we refer to annual heating degree days, or the sum of all heating degree days experienced during a year.
Home energy expenditures	Expenditures for home space heating and home space cooling and ventilation.
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 below the Federal maximum LIHEAP income standard – 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.
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.

<sup>1/</sup>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

<sup>22</sup>As noted in Table 3-2, the data files used in this study include surveys from 1979 and 1981. The variable that designates LIHEAP eligibility was not coded for those data files.

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 <sup>1/</sup>										
	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	FY 2008
Survey <sup>2/</sup>	NIECS	RECS	RECS	RECS	RECS	RECS	RECS	RECS	RECS	RECS	RECS
Interview date <sup>3/</sup>	9/78	9/80	9/82	9/84	9/87	9/90	10/93	5/97	5/01	8/05	4/
Billing data <sup>5/</sup>	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	1/05 to 12/05
Income data <sup>6/</sup>	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2008
Sample size	4,081	6,051	4,724	5,682	6,229	5,095	7,111	5,900	5,318	4,382	4,382

- <sup>1/</sup>Represents the year that includes the last month for which billing data were collected from fuel suppliers.
- <sup>2/</sup>Surveys include the National Interim Energy Consumption Survey (NIECS) and the RECS.
- <sup>3/</sup>Month and year in which household interviews began.
- <sup>4/</sup>Data projected from the 2005 RECS using changes in weather and prices. See Appendix A for the procedure used to calculate the projections.
- <sup>5/</sup>Time period in which residential energy bills were collected from fuel suppliers.
- <sup>6/</sup>Mean income computed using calendar year data from the CPS ASEC.

## Trends in 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 33.1 percent in 2005, while they have reduced their use of fuel oil as a main heating fuel, from 20.0 percent in 1979 to 8.1 percent in 2005.<sup>23</sup> In addition, the use of wood or coal as a main heating fuel (included under “Other”) peaked in 1985, declined substantially through 2001, then almost doubled by 2005.

Figure 3-2 shows that low income households increased their use of central air-conditioning systems from 8.5 percent in 1979 to 42.8 percent in 2005.<sup>24</sup> The proportion of low income households with no air-conditioning fell from 62.8 percent in 1979 to 20.1 percent in 2005. Other things being equal, increased use of air-conditioning equipment among low income households can be expected to increase home cooling expenditures.

<sup>23</sup>For all households, the share using electricity as their main heating fuel grew from 15.8 percent in 1979 to 30.1 percent in 2005, and the share using fuel oil as their main heat fell from 22.1 percent to 6.9 percent.

<sup>24</sup>For all households, the share using electric central air-conditioning grew from 23 percent in 1979 to 58 percent in 2005.

Figure 3-1. Main heating fuel for households with incomes at or below 150 percent of HHS' poverty guidelines, 1979 to 2005

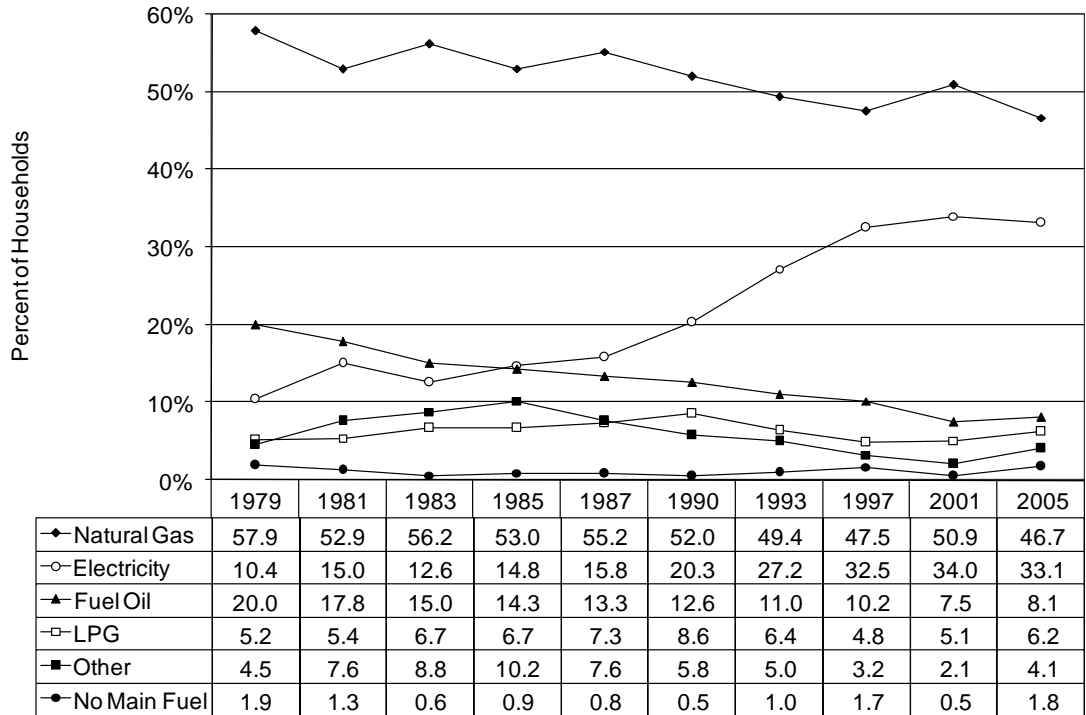
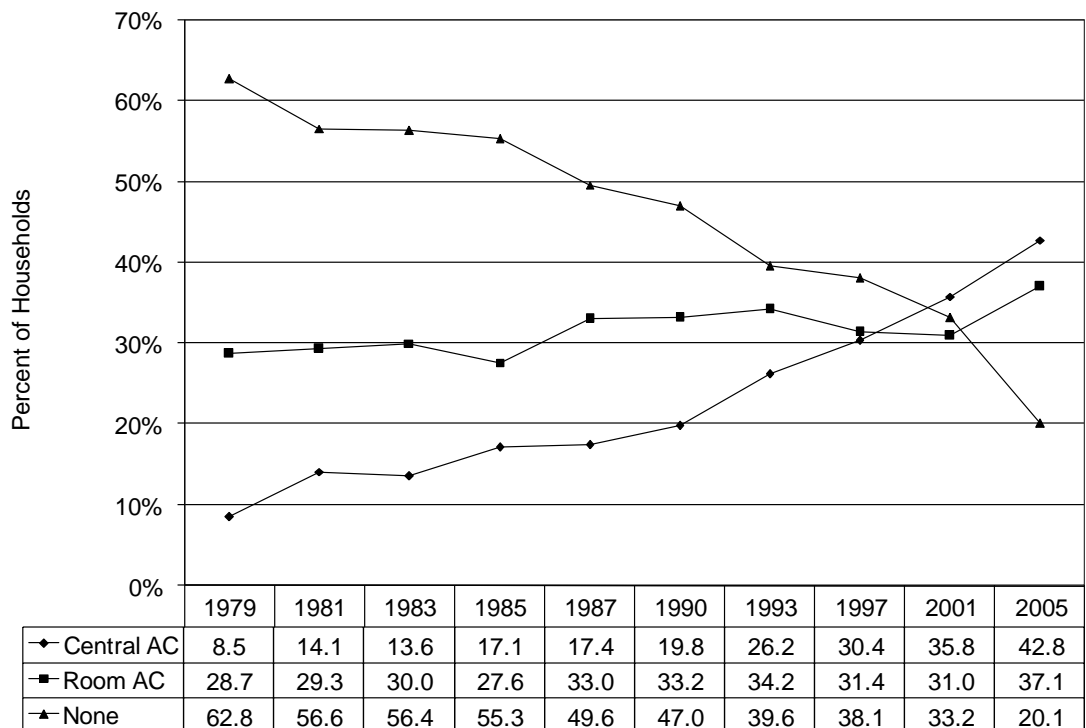


Figure 3-2. Air-conditioning type for households with incomes at or below 150 percent of HHS' poverty guidelines, 1979 to 2005





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 2008. 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.<sup>25</sup> 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 by over 10 percent in 2005 through FY 2008.

**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 2008**

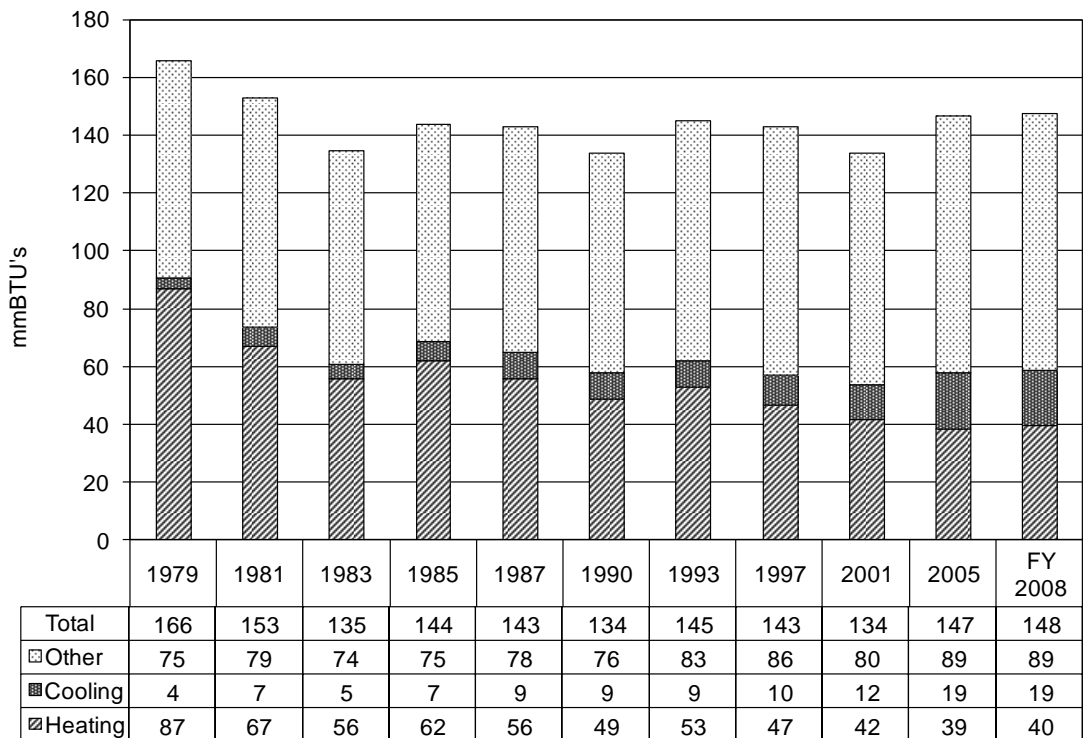
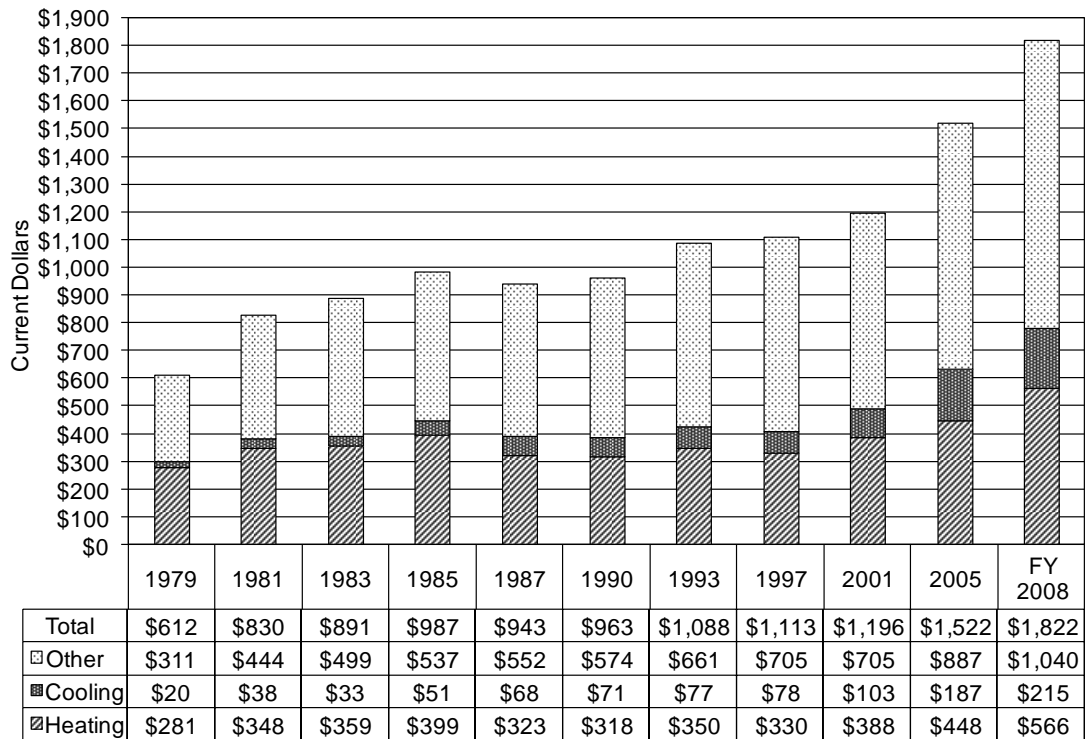


Figure 3-4, on the next page, shows that mean residential energy expenditures for low income households increased rapidly from 1979 to 1985; the increases were the result of fuel price increases. Examination of the components of energy expenditures indicates that the greatest increases were in home cooling and other residential expenditures, while increases in home heating expenditures were more moderate until 2005. 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. By FY 2008, mean residential energy expenditures rose by almost 20 percent to \$1,822. Mean home heating expenditures fell from \$399 in 1985 to \$318 in 1990, then rose and fell moderately until 1997. Home heating expenditures saw an 18 percent increase in 2001 over 1997

<sup>25</sup>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.

and a 15 percent increase in 2005 over 2001. Mean home heating expenditures rose by over 17 percent in FY 2008. The increase in expenditures in 2005 and FY 2008 were the result of higher fuel prices. Mean home cooling expenditures rose continuously from \$51 in 1985 to \$187 in 2005. In FY 2008 mean home cooling expenditures were \$215.

**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 2008**



The next series of Figures, 3-5 through 3-7, furnishes information on energy burden for low income households.<sup>26</sup> 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.<sup>27</sup> 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 RECS and CPS ASEC 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 RECS and CPS ASEC data, the energy burden for each individual household in a given set (such as low income households)

<sup>26</sup>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.

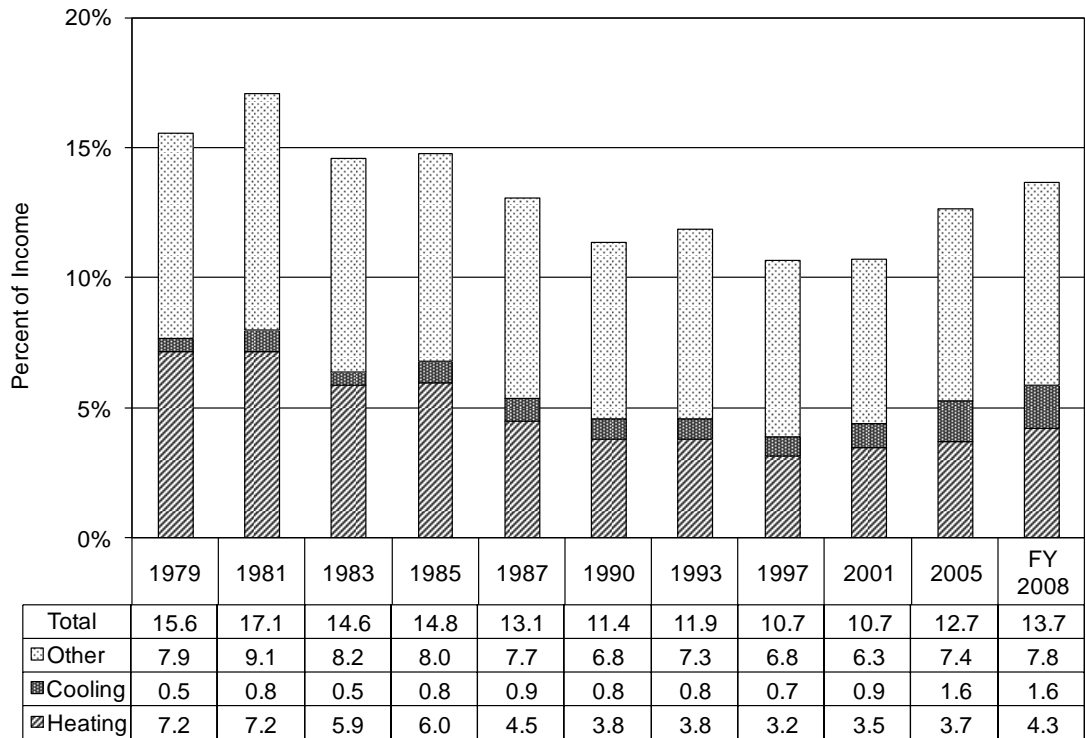
<sup>27</sup>The mean is the sum of all values divided by the number of values, or what is commonly called the average. The median is the value at the midpoint in the distribution of values.

and finding the 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.<sup>28</sup>

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 and 5.3 percent in 2005. This increase in home energy burden was the result of the dramatic increase in expenditures for home energy due to higher prices. In FY 2008, burden increased to 5.9 percent because expenditures rose. Home energy burden for FY 2008 was 34 percent higher than in 2001, over 11 percent higher than in 2005, but was 26 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 2008**

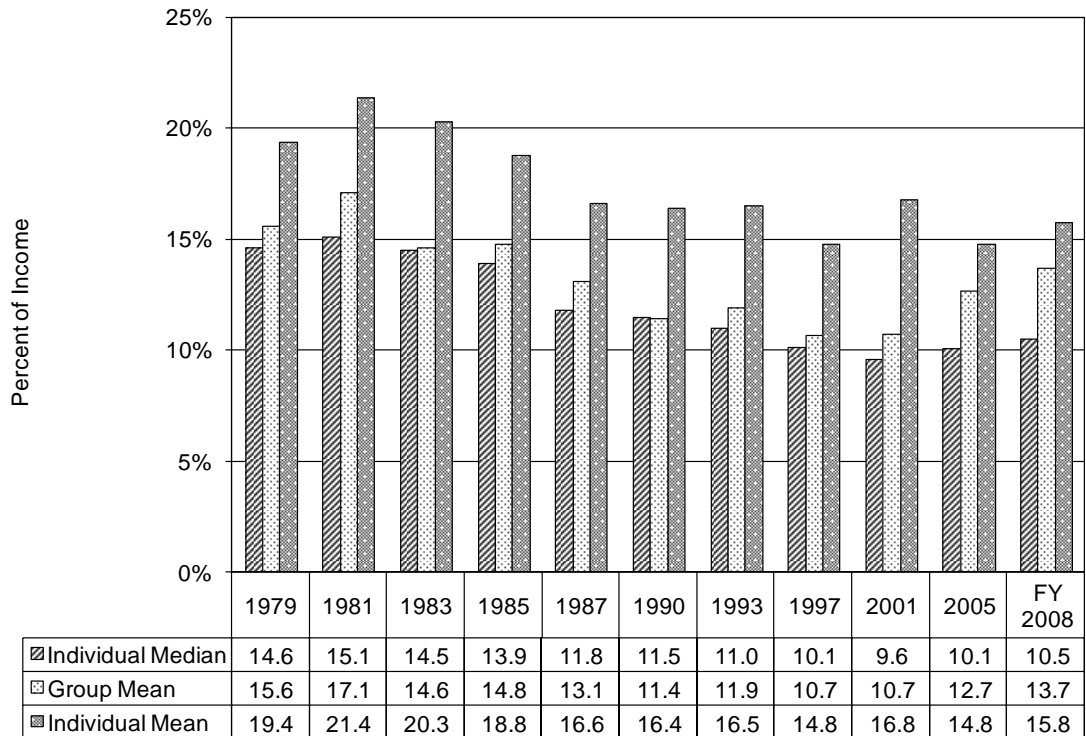


Figures 3-6 and 3-7 show how the mean individual and median individual energy burden statistics compare to the group energy burden statistics. Figure 3-6 shows the trends in residential energy burden for low income households, and Figure 3-7 shows the trends in home energy burden for low income households. In 2005, the mean individual residential energy burden was 14.8 percent, significantly higher than the median individual burden of 10.1 percent and the mean group burden of 12.7 percent. In 2005, the mean individual home energy burden was 6.8 percent, the median

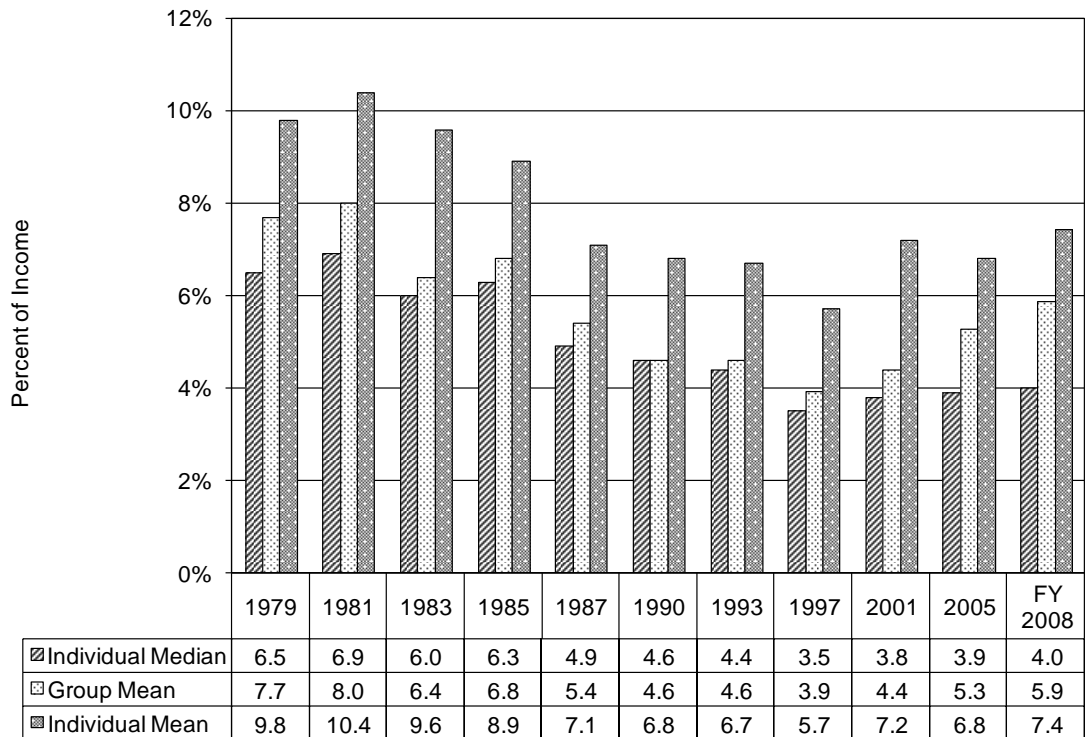
<sup>28</sup> See Appendix A for additional information on the interpretation of alternative burden statistics.

individual burden was 3.9 percent, and the mean group burden was 5.3 percent. For all three summary statistics, the highest home energy burden occurred in 1981 and the lowest home energy burden occurred in 1997. For FY 2008, median individual residential energy burden was over 30 percent lower, group mean burden was 20 percent lower, and individual mean burden was 26 percent lower than the 1981 peak.

**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 2008**



**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 2008**

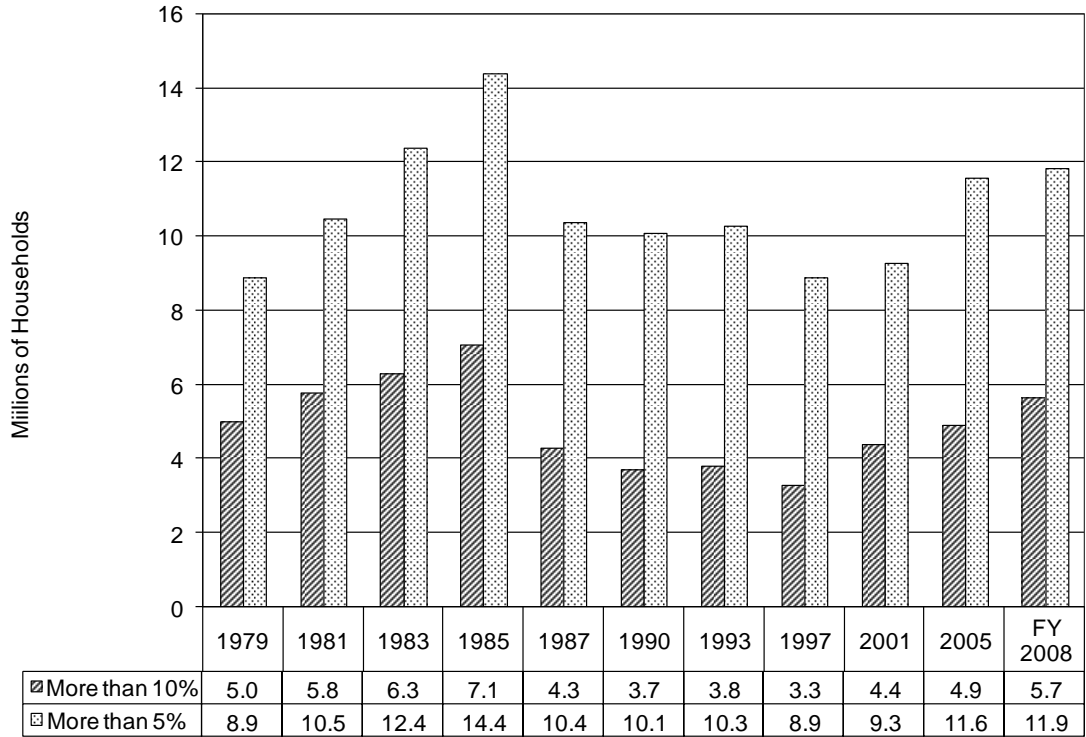


Figures 3-8 and 3-9 present information on the number and percent of low income households that had home energy burdens that exceeded specified levels. The levels are reference points and do not represent any judgment regarding an “affordable” level of energy burden.

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 2008, the percent of households exceeding the specified levels increased by at most 8 percent, while the number of households exceeding the specified levels increased by at least 28 percent. The number of low income households with home energy burdens exceeding 10 percent of income in FY 2008 was almost 20 percent less than the 1985 level and 14 percent more than the 1979 level.

**Figure 3-8. Number of low income households spending over 5 percent and 10 percent of income on home energy, 1979 to FY 2008**



**Figure 3-9. Percent of low income households spending over 5 percent and 10 percent of income on home energy, 1979 to FY 2008**

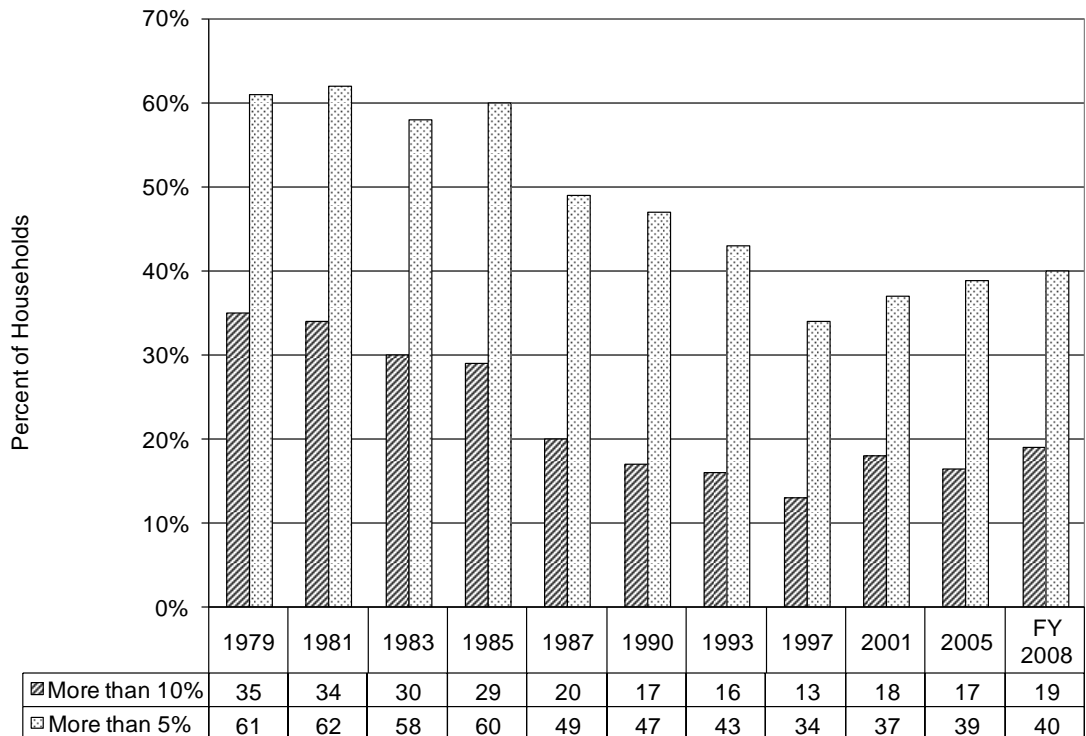


Figure 3-10 shows the total assistance funding that would be required to reduce the home energy burden for all low income households to 10 percent of income and 5 percent of income.<sup>29</sup> The amount required for a reduction in the home energy burden of low income households to 5 percent of income was \$2.2 billion in 1979, \$4.6 billion by 1985, \$3.3 billion in 2001, \$5.5 billion in 2005, and \$8.0 billion in FY 2008. 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 2008, both the number of low income households exceeding the percent of income reference points and their average expenditures increased. Therefore, total dollars of assistance funding required to reduce home energy burdens rose substantially.

**Figure 3-10. Total fuel assistance dollars needed to reduce low income household spending on home energy to 5 percent and 10 percent of income, 1979 to FY 2008**

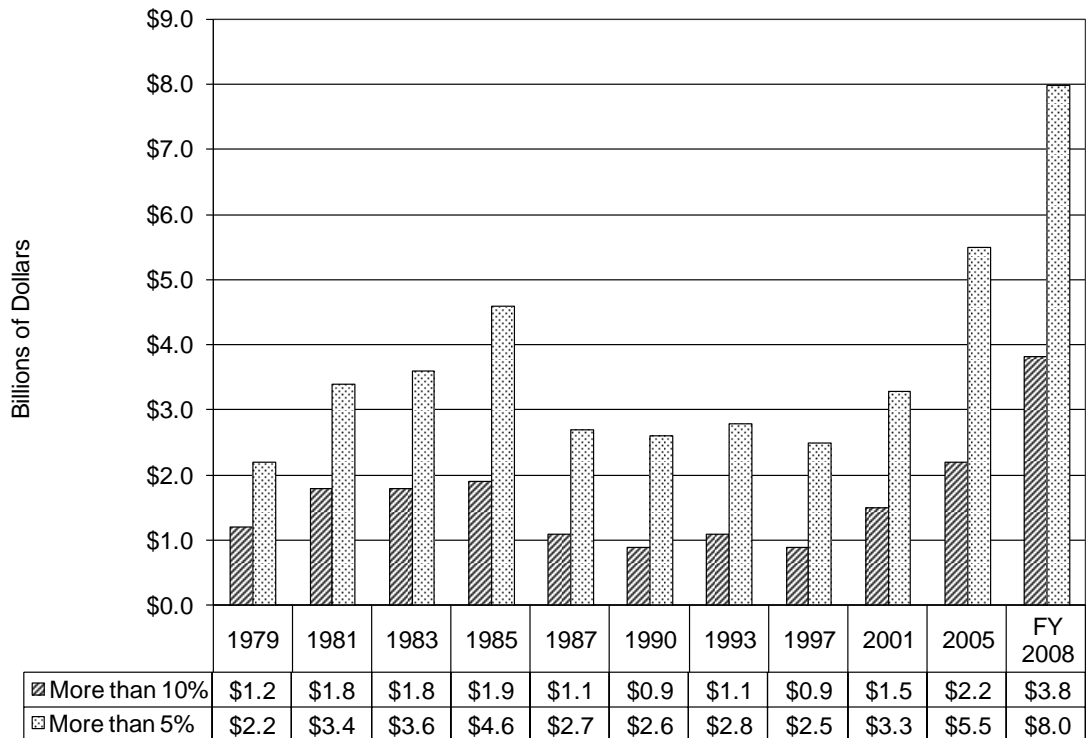
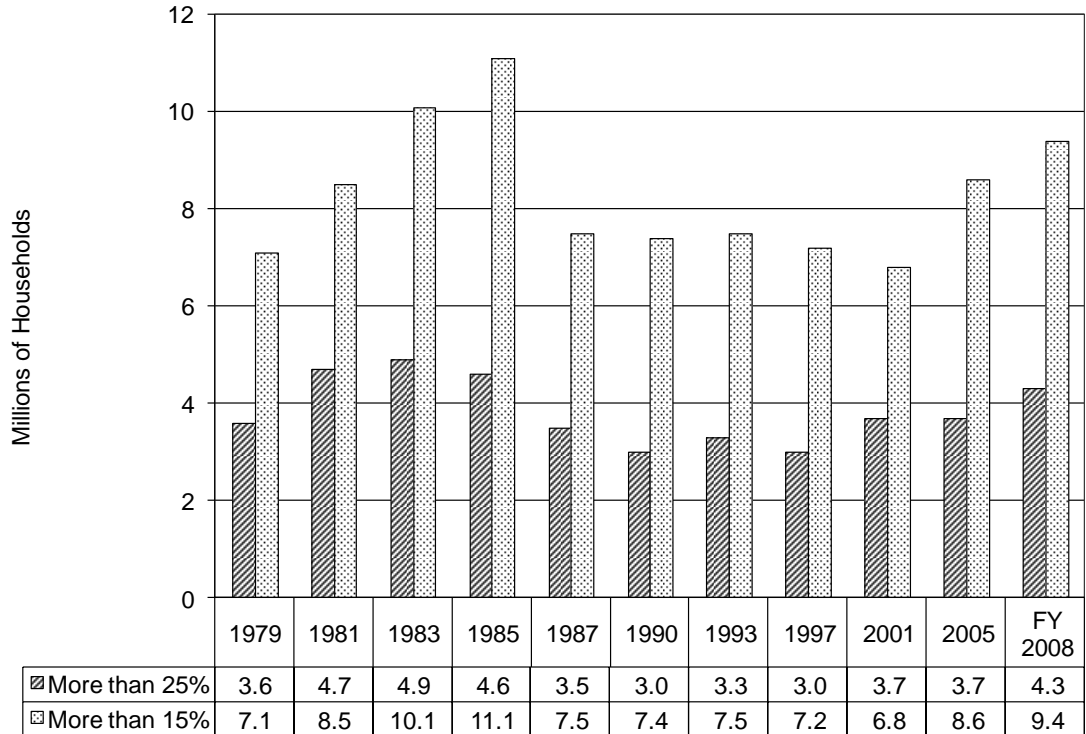


Figure 3-11 furnishes statistics on the number of low income households that had residential energy expenditures that exceeded specified levels. Figure 3-12 furnishes statistics on total fuel assistance dollars needed to reduce residential energy burden to specified levels. Figure 3-11 shows that the 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 households exceeded the specified percentages in 1983 and 1985. While the numbers exceeding 15 and 25 percent of

<sup>29</sup> 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 were lower in FY 2008 than during the peak years, they were higher in FY 2008 than at any time since the peak years. Figure 3-12 demonstrates that the funds required to reduce all low income households to the specified percentages reached their highest levels in FY 2008.

**Figure 3-11. Number of low income households spending over 15 percent and 25 percent of income on residential energy, 1979 to FY 2008**





**Figure 3-12. Total fuel assistance dollars needed to reduce low income household spending on residential energy to 15 percent and 25 percent of income, 1979 to FY 2008**

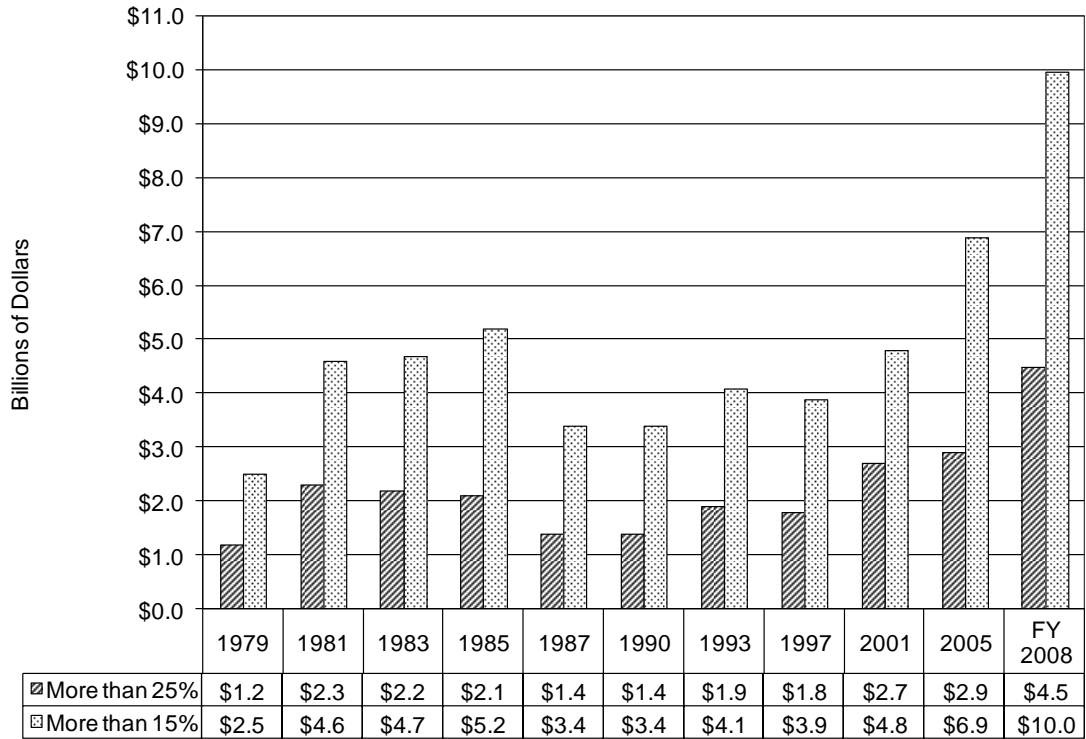


Figure 3-13 shows how the aggregated residential energy bill for all low income households has changed from 1979 to FY 2008. In 1979, the aggregated home energy bill (heating costs plus cooling costs) for low income households was \$4.5 billion. By FY 2008, the aggregated home energy bill had grown to \$18.6 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 2008, home energy costs accounted for 42.9 percent of the total low income residential energy bill.

**Figure 3-13. Aggregated residential energy expenditures by end use for households with incomes at or below 150 percent of HHS' poverty guidelines, 1979 to FY 2008**

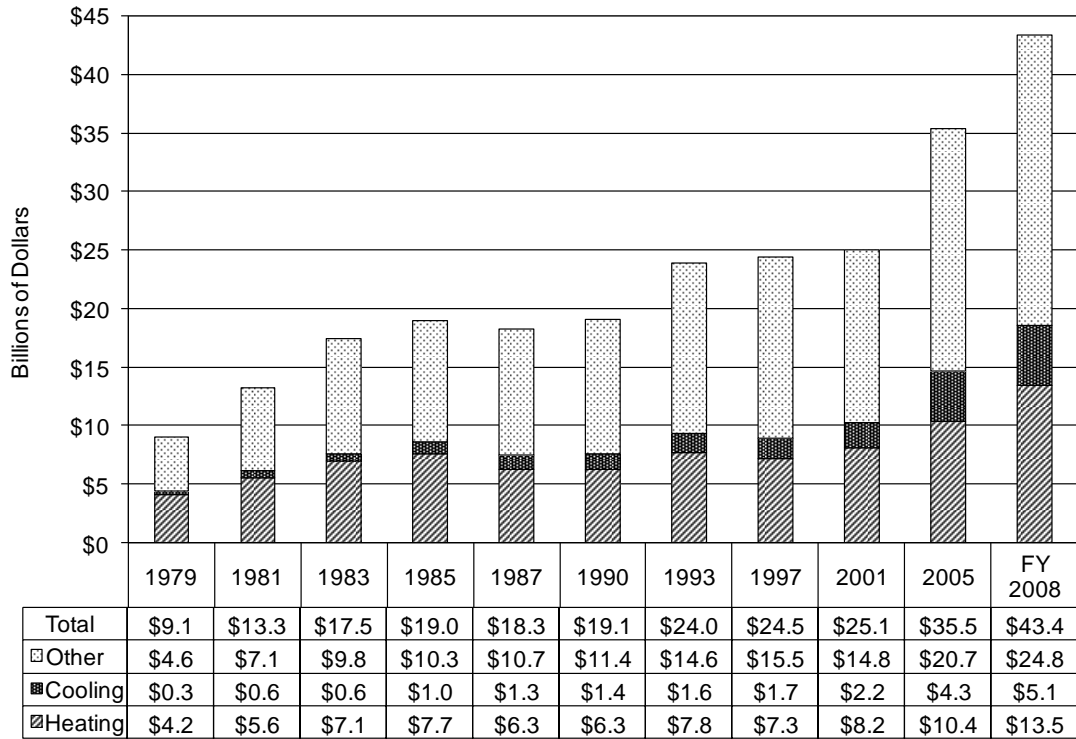
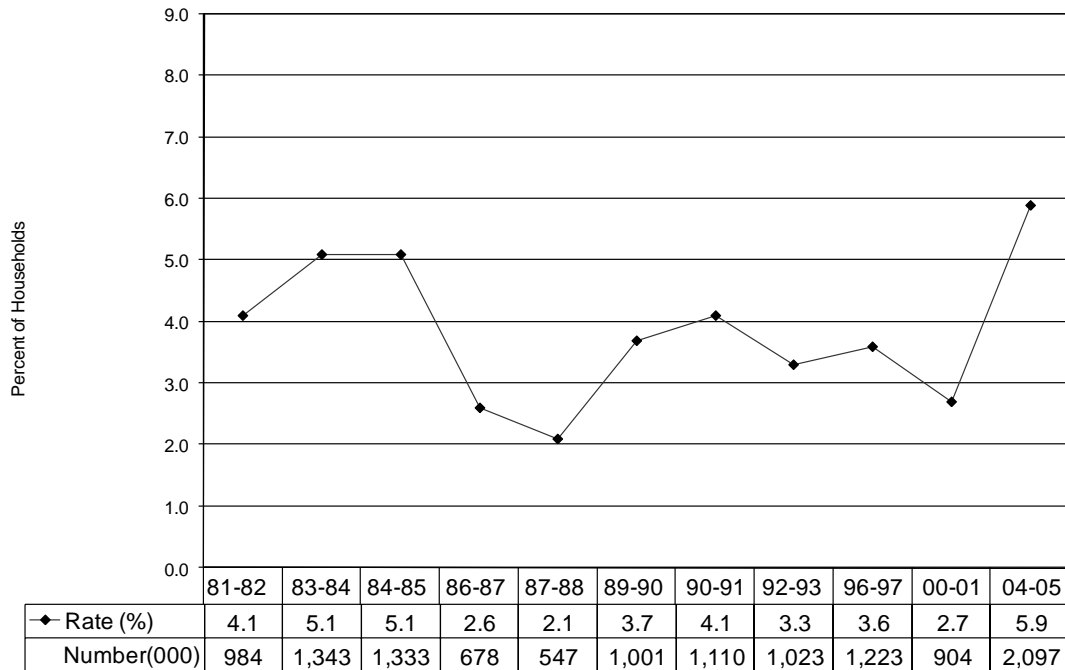


Figure 3-14, on the next page, demonstrates the impact of the inability to afford home energy on LIHEAP income eligible households. It shows the number of LIHEAP income eligible households that reported that they were unable to use their main source of heat for a period of two hours or more during the 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.

**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 2004-05 heating season<sup>30</sup>**



## 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 2008. 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 increased by 45 percent over 1997 prices. The increase in fuel prices explains why expenditures also

<sup>30</sup>Data for 2004-2005 heating season refer to heat interruptions of any length. Data for the 1981-82 heating season refer to heat interruptions of one day or more. 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.

rose. In FY 2008, fuel prices increased by almost 20 percent over 2005 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 2008**

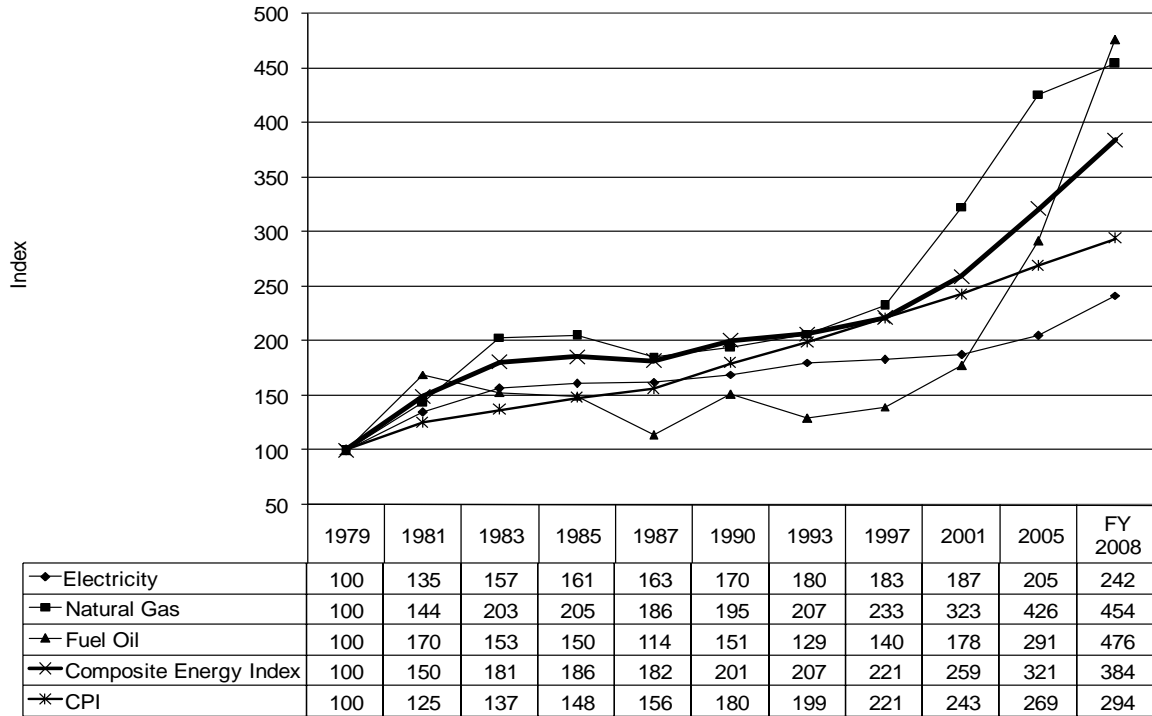


Figure 3-16 demonstrates how changes in heating energy consumption among low income households from 1979 to FY 2008 compared to changes in heating degree days for the same period. From 1979 to 1983, home heating consumption fell more rapidly than did heating degree days, suggesting a significant increase 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. In FY 2008, both consumption and heating days increased slightly, and consumption per heating degree day decreased slightly.

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 2008

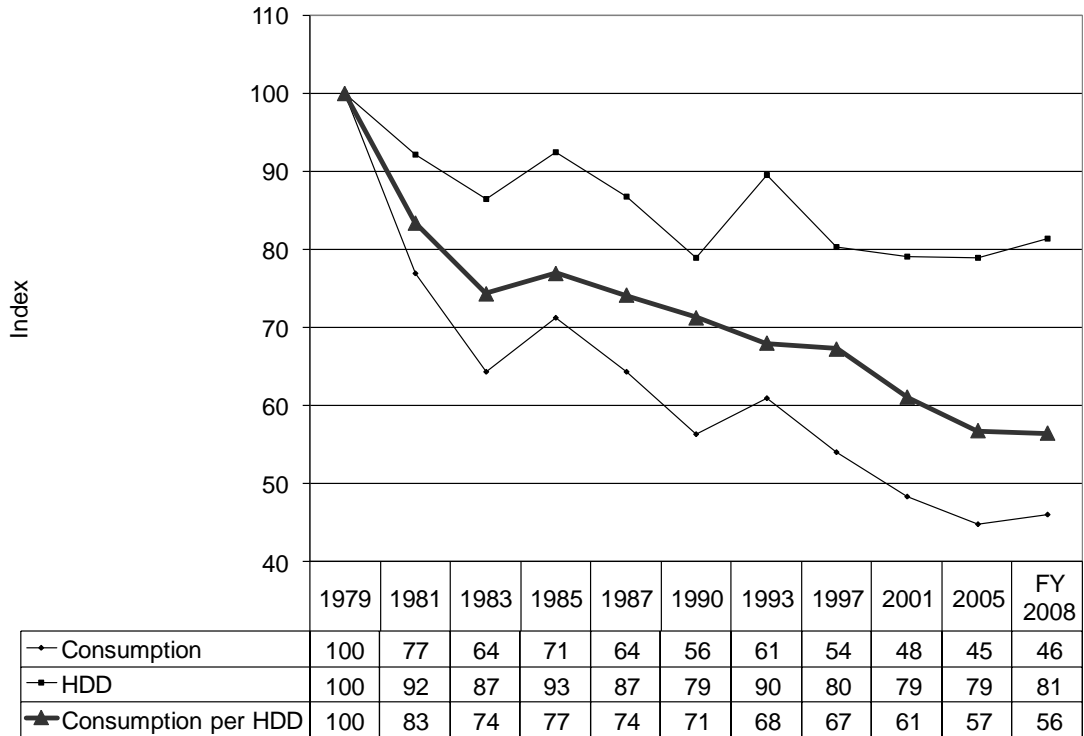
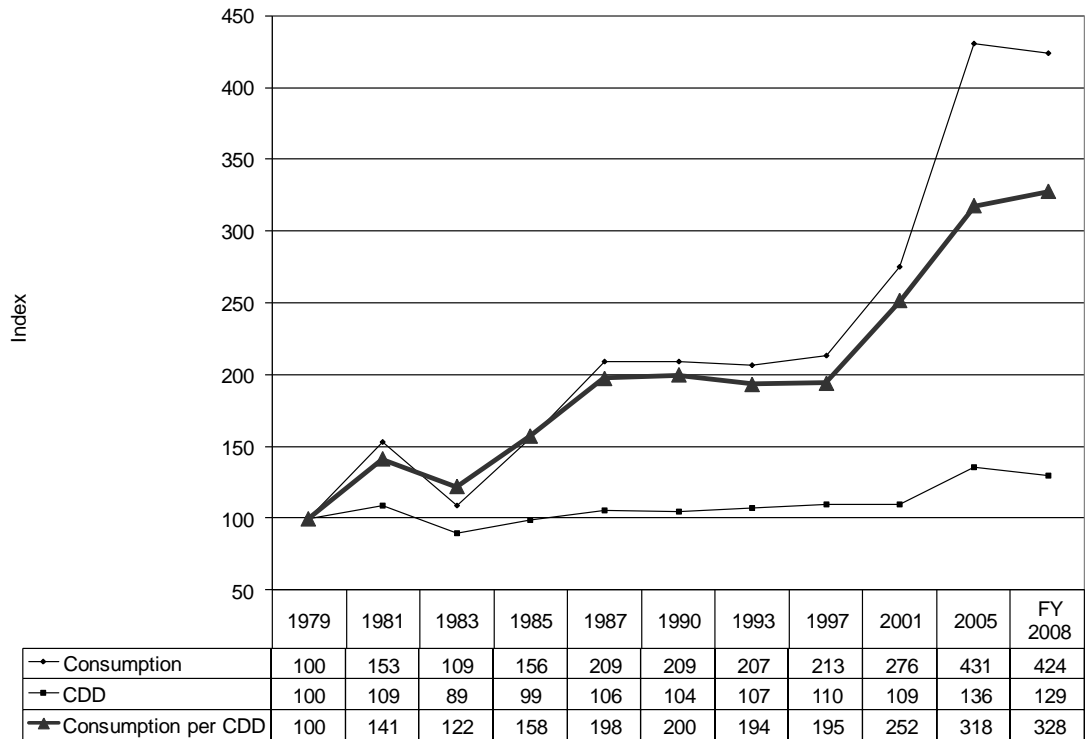


Figure 3-17 shows that home cooling consumption trends among low income households are somewhat more complex than are home heating consumption trends. In FY 2008, mean home cooling consumption was much higher than it was in 1979, even though households experienced only slightly more cooling degree days. Thus, mean consumption per cooling degree day increased substantially from 1979 to FY 2008, 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.<sup>31</sup> As shown in Figure 3-2, only 37 percent of low income households had air-conditioning in 1979, while in 2005, 80 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 2008 or year-to-year changes in consumption in response to changes in cooling degree days.

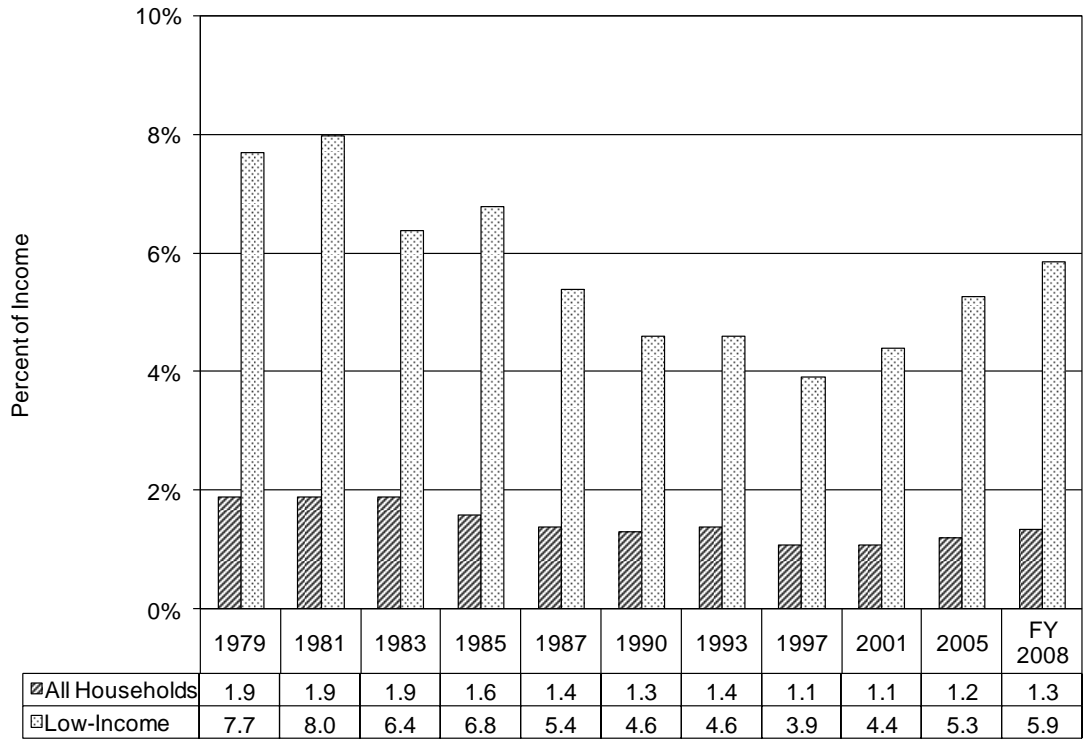
<sup>31</sup>Air-conditioning equipment includes central air conditioners and window or wall units, ceiling fans, and evaporative coolers. The availability of all household appliances increased for low income households over this period due to the overall increase in the wealth of the nation and the 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 2008**

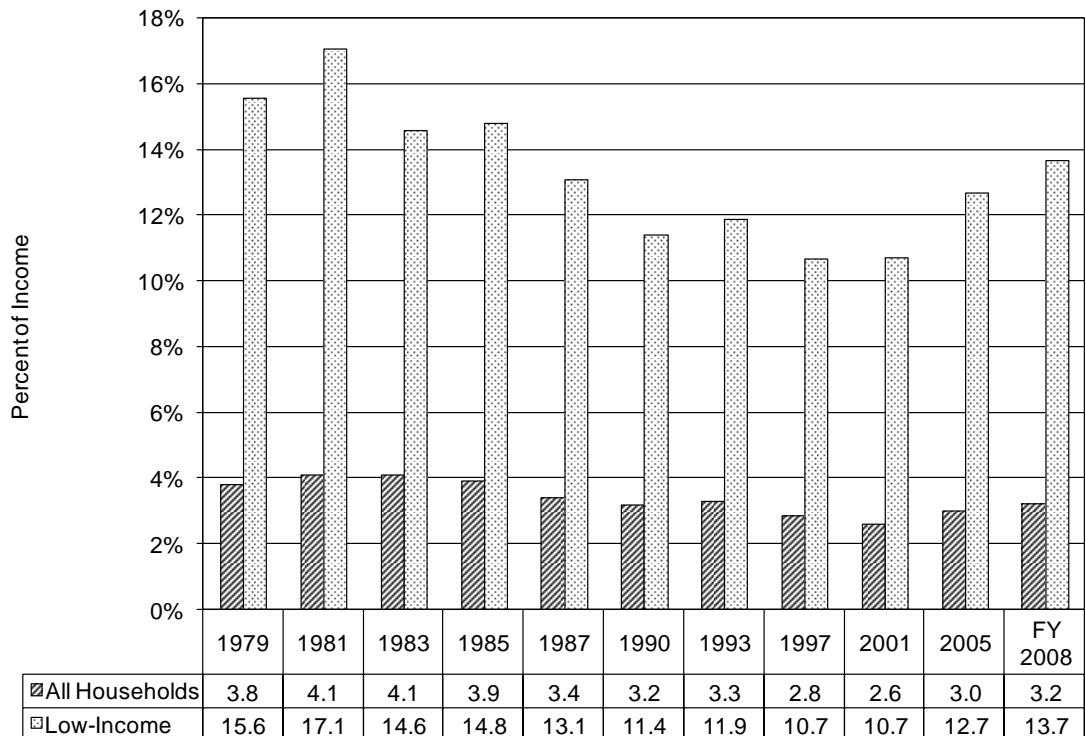


Figures 3-18 and 3-19, on the next page, show that the mean group energy burden for low income households is substantially higher than that for all households. In FY 2008, the mean group home energy burden for all households was 1.3 percent, and that for low income households was 5.9 percent. In FY 2008, the mean group residential burden was 3.2 percent for all households and 13.7 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 2008, 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 2008**



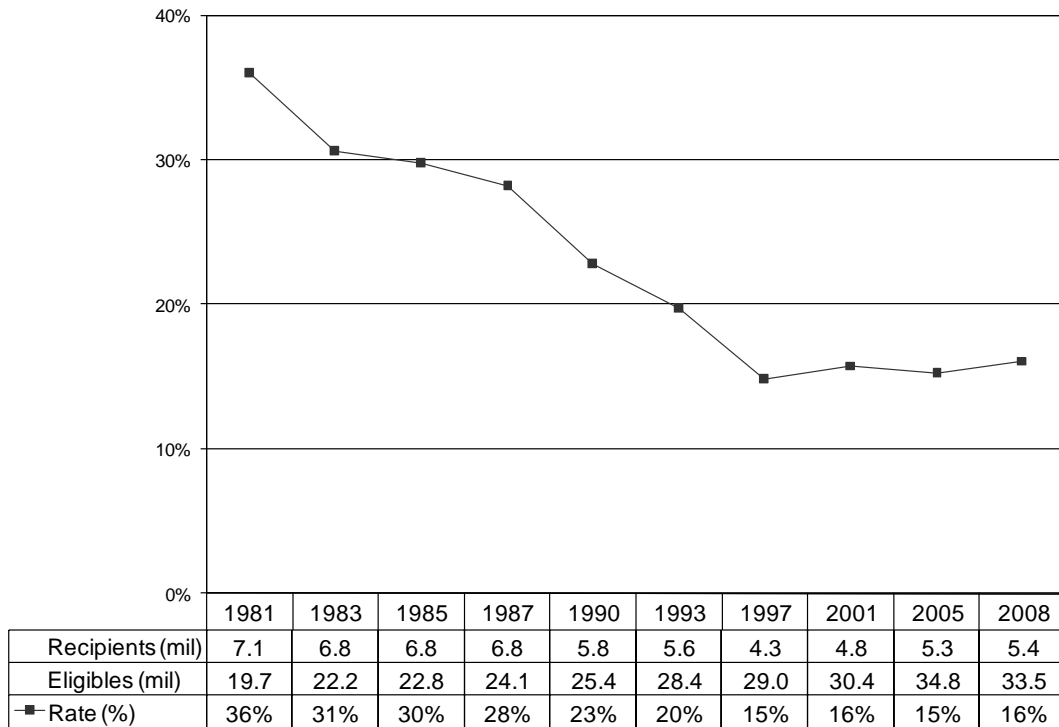
**Figure 3-19. Mean group residential energy burden for all households and for households with incomes at or below 150 percent of HHS' poverty guidelines, 1979 to FY 2008**



## Trends in LIHEAP

Figures 3-20 through 3-24 furnish information on trends for HHS' energy assistance programs from FY 1981 through FY 2008. 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 has 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.<sup>32</sup> By FY 2008, 16 percent of LIHEAP income eligible households received those benefits. Figure 3-21, on the next page, furnishes statistics on the count of recipients by benefit type.

**Figure 3-20. Percentage of LIHEAP/LIHEAP Federally eligible households receiving LIHEAP/LIHEAP heating and/or winter crisis assistance, FY 1981 to FY 2008**



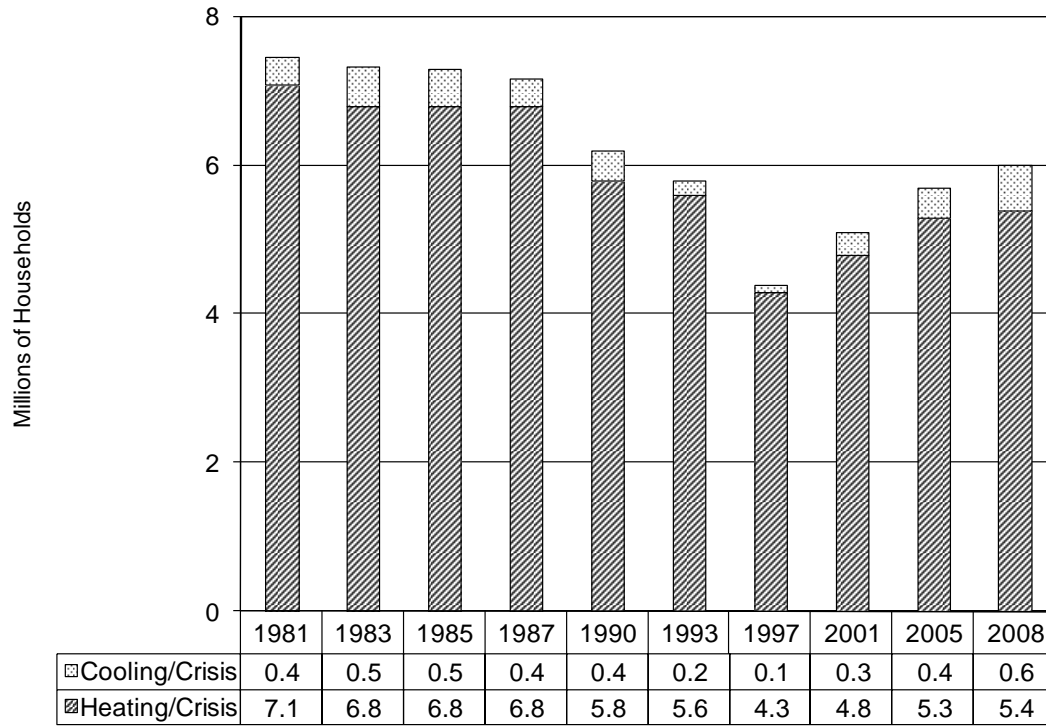
NOTE: The FY 1981 estimate of income eligible households is not directly comparable to those of the other years because the income eligibility guidelines for the FY 1981 program differed from those of other years.

SOURCE: HHS Administrative Data — such data for FY 2008 are preliminary; thus the actual figures may differ.

<sup>32</sup>Note that the Federal income eligibility guidelines for the FY 1981 Low Income Energy Assistance Program (LIEAP) were different from those for subsequent LIHEAP programs included in the table.



**Figure 3-21. Number of households receiving LIHEAP/LIHEAP heating and/or winter crisis assistance or cooling and/or summer crisis assistance, FY 1981 to FY 2008<sup>1/</sup>**

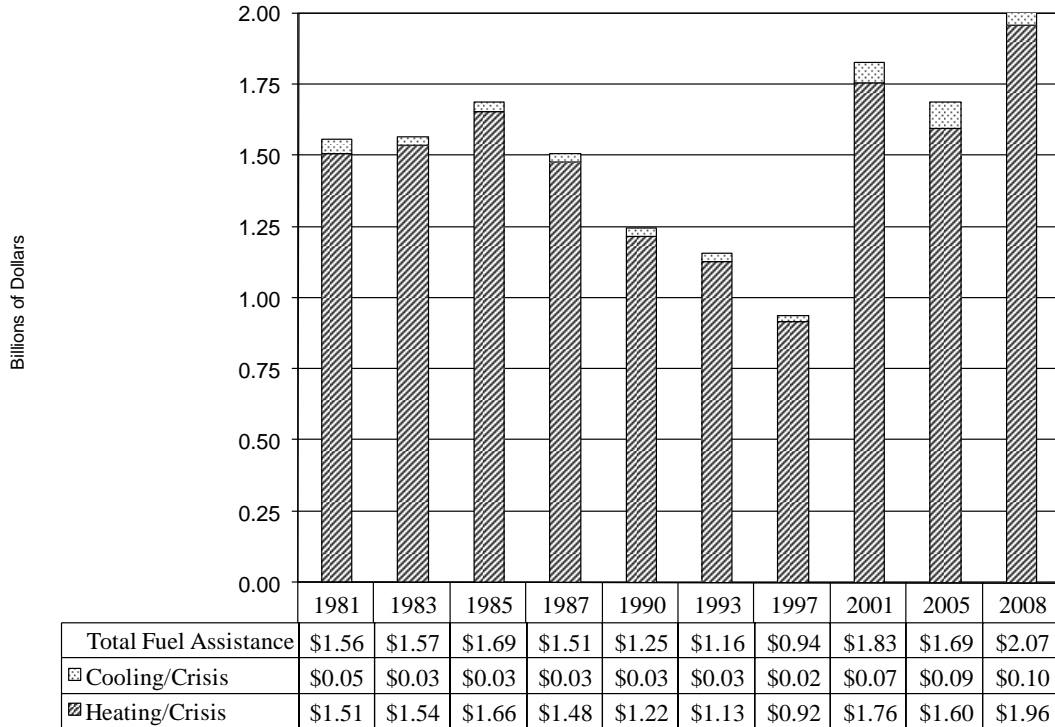


SOURCE: HHS Administrative Data — such data for FY 2008 are preliminary; thus the actual figures may differ.

<sup>1/</sup>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.

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 2008, when \$2.07 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. The large funding increase for FY 2001 was due in part to the substantial increase in funds for cooling assistance benefits.

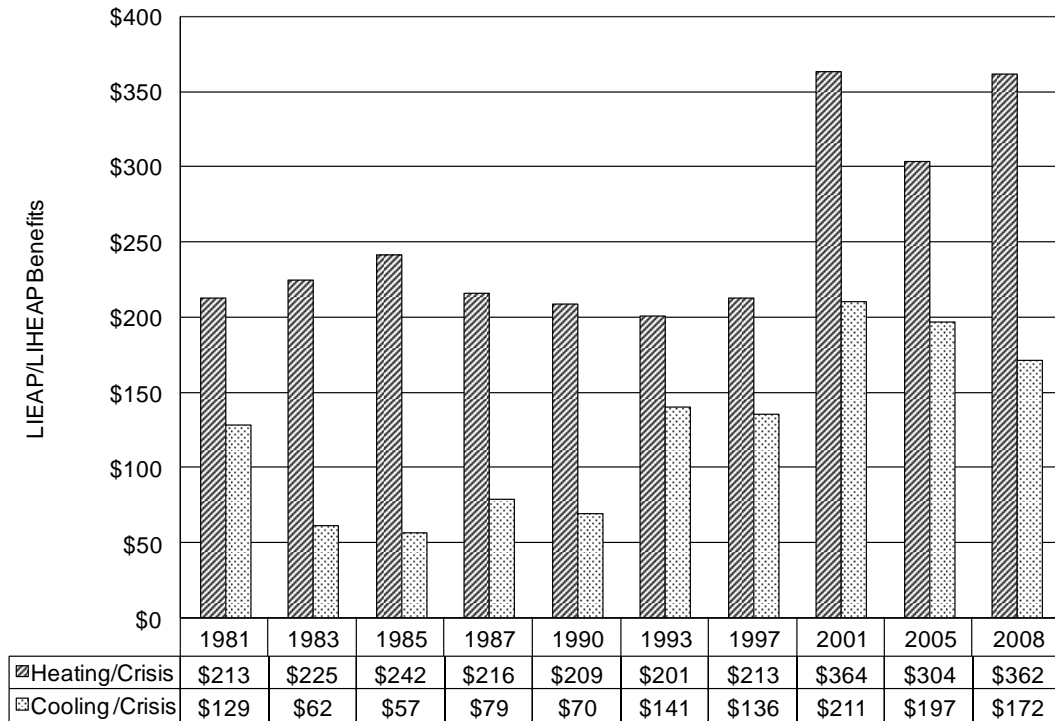
**Figure 3-22. Funds used for LIEAP/LIHEAP fuel assistance, FY 1981 to FY 2008**



SOURCE: HHS Administrative Data — such data for FY 2008 are preliminary; thus the actual figures may differ.

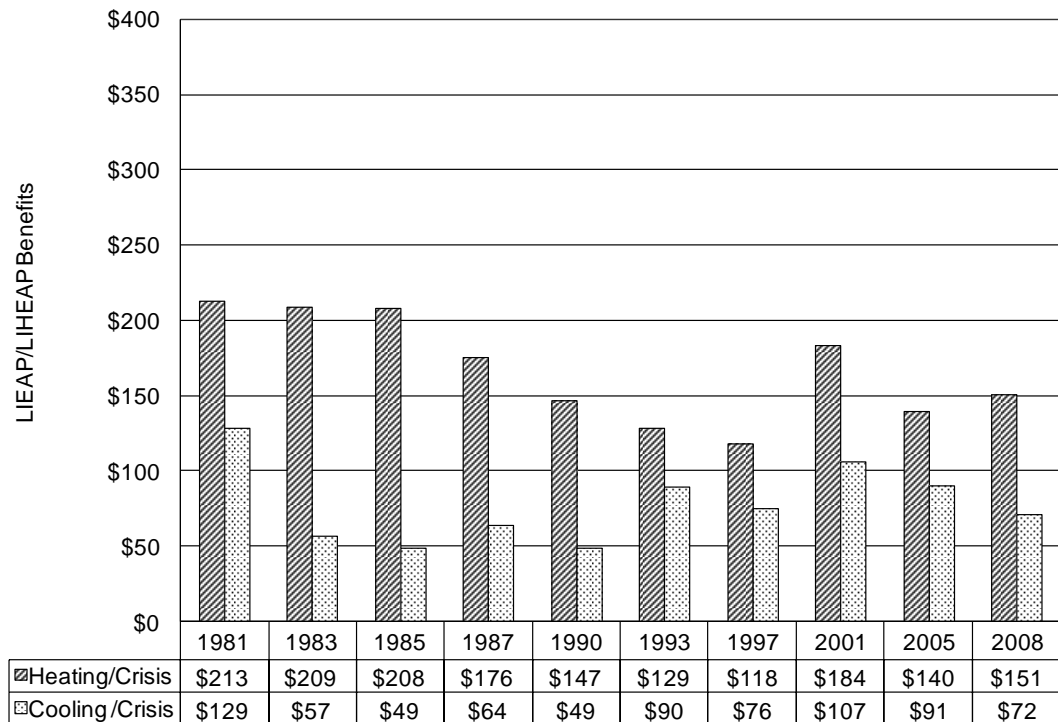
Figure 3-23 on the following page shows that, for the years shown, mean heating/winter crisis benefits were \$213 in FY 1981, grew to \$242 in FY 1985, fell back to \$213 in 1997, rose to \$364 in FY 2001, dropped to \$304 in FY 2005, and then rose to \$362 in FY 2008. Figure 3-24 shows that, after adjusting for inflation, the mean value of benefits has fallen substantially. The mean value of heating and/or winter crisis benefits, in 1981 dollars, fell from \$213 in FY 1981 to \$151 in FY 2008. 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 2008, mean cooling benefits decreased to \$72. 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 2008**



SOURCE: HHS Administrative Data — such data for FY 2008 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 2008**



SOURCE: HHS Administrative Data — such data for FY 2008 are preliminary; thus the actual figures may differ.

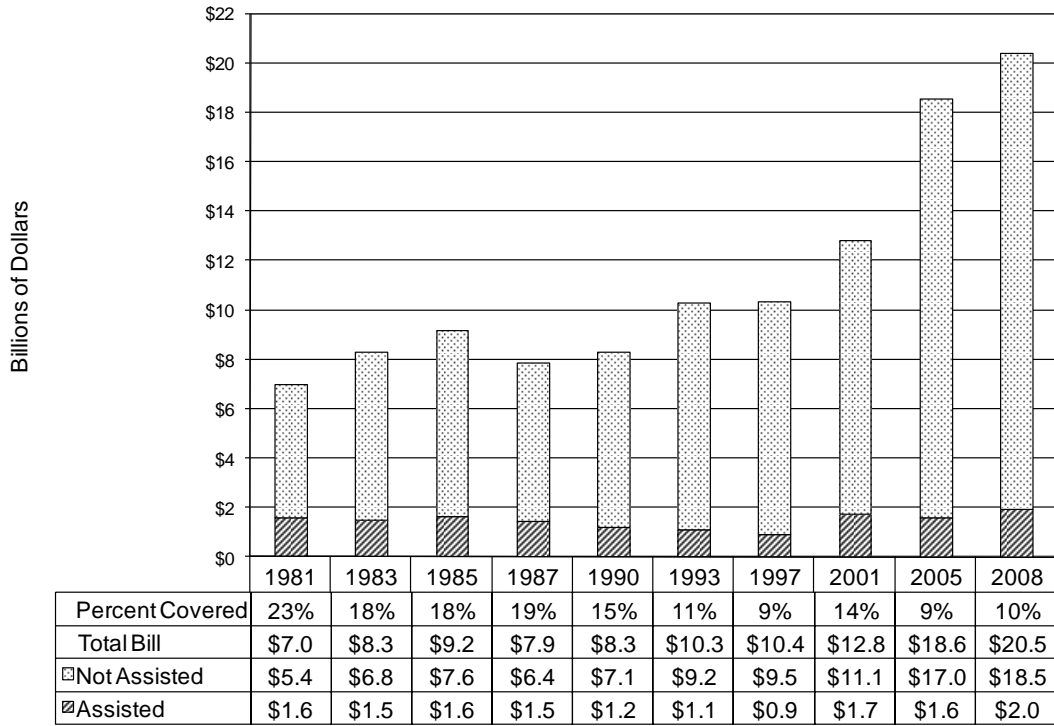
## **Analysis of LIHEAP benefits**

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 10 percent in FY 2008. An increase in the size of the total bill and an increase in the number of households eligible for assistance benefits caused this reduction.

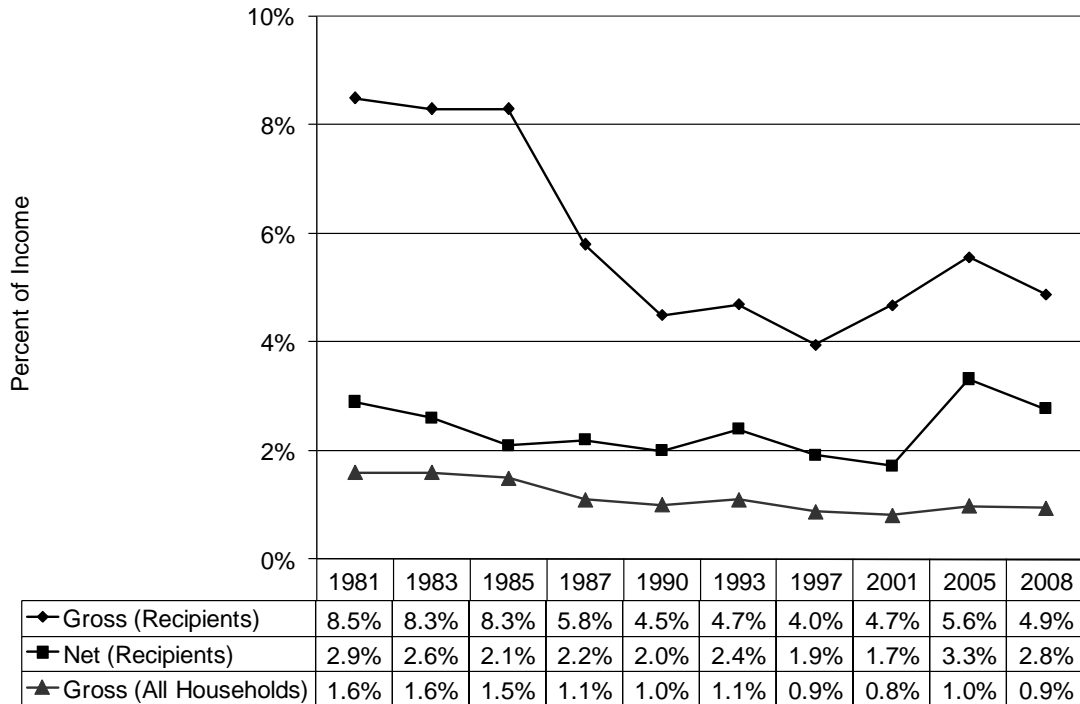
Figure 3-26 shows that the net effect of LIHEAP has been to lower recipient group home heating burdens to levels that are much closer to the levels of the average household. In FY 1981, the gross mean group home heating burden for LIHEAP recipients was 8.5 percent, while the net mean group home heating burden (with home heating expenditures taken after deducting LIHEAP benefits) was 2.9 percent. In FY 2008, the gross mean group home heating burden for LIHEAP recipients was 4.9 percent, while the net mean group home heating burden was 2.8 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 1.4 and 2.2 times as high as the gross mean group home heating burden for all households except for FY 2005 and FY 2008 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 2008, the net mean group home heating burden for LIHEAP recipients decreased slightly to 2.8 percent.

**Figure 3-25. Amount and percentage of total home heating billed amounts for LIHEAP/LIHEAP income eligible households covered by LIHEAP/LIHEAP heating and winter crisis benefits, FY 1981 to FY 2008**



SOURCE: Assistance number from HHS data and heating bill estimates from RECS — HHS data for FY 2008 are preliminary; thus the actual figures may differ.

**Figure 3-26. Mean group home heating burden for all households and LIEAP/LIHEAP heating and winter crisis recipient households, FY 1981 to FY 2008**



SOURCE: Mean burden uses 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) 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 LIHEAP performance plan takes into account that the fact 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 certain 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 2008, 16 percent of 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 home energy needs:

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

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

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

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

Based on the national LIHEAP program goals, ACF has focused its annual performance goals on targeting the availability of LIHEAP heating assistance to vulnerable low income households. In addition, ACF has set 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 benefits to the highest-burden households.

## **Performance measures**

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

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

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

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

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

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



result by 100.<sup>33</sup> For example, if high burden recipients have their median individual energy burden reduced by 25 percent (e.g., from 8 percent of income to 6 percent of income) and all recipient households have their median individual energy burden reduced by 20 percent (e.g., from 5 percent of income to 4 percent of income), the burden reduction targeting index is 125 (100 times 25 divided by 20).

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

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

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

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

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

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

ACF's annual LIHEAP performance measures are:

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

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<sup>33</sup>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 reciprocity variables are not highly skewed (or distorted); therefore, mean benefits are used to compute the benefit targeting index. Energy burden variables, however, are highly skewed; thus the median energy burden, which is less affected by extreme values, is used to calculate the burden reduction index.

There are no annual measures for the benefit targeting or burden reduction targeting indexes because the data that enter into these indexes are not available annually. The baseline value for the burden reduction targeting index was computed for 2001 using the Residential Energy Consumption Survey (RECS) LIHEAP Supplement. However, this index can be updated only as often as the RECS occurs, which is generally every four years. The last update to this index came from the 2005 RECS data.

## **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.<sup>34</sup>
- 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.<sup>35</sup>

These studies are available on the web, either electronically or by request, at [http://www.acf.hhs.gov/programs/ocs/liheap/publications/publications\\_reports.html#s](http://www.acf.hhs.gov/programs/ocs/liheap/publications/publications_reports.html#s).

## **Performance measurement data sources**

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

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

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

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<sup>34</sup> *LIHEAP Targeting Performance Measurement Statistics: GPRA Validation of Estimation Procedures*, August 2004, prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.

<sup>35</sup> *LIHEAP Energy Burden Evaluation Study*, March 2005, prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.

- 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.<sup>36</sup>
- 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 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 recipient households.
- 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 2008 were available in October 2008.
- Federal LIHEAP Household Report – The preliminary LIHEAP Household Reports for FY 2008 were due from the States by September 1, 2008, when the States' LIHEAP block grant applications for FY 2009 were due. ACF set a goal for the States to submit their final LIHEAP Household Report for FY 2008 by December 2008. Each LIHEAP Household Report needs to be received, reviewed, processed, and compared against data from each State's Federal LIHEAP Grantee Survey for FY 2008 that was conducted in February 2009. The data on the number of LIHEAP households assisted in FY 2008 will be included in the *LIHEAP Report to Congress* for FY 2008.
- The RECS – The EIA's RECS is a national household sample survey that is conducted once every four years. The most recent survey was conducted in 2005. 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 2005). However, the RECS currently cannot furnish annual updates on LIHEAP targeting performance for high energy burden households.

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<sup>36</sup> "Guidance on Income and Poverty Estimates From Different Sources." U.S. Census Bureau. Housing and Household Economic Statistics Division. 21 Sep. 2009 <http://www.census.gov/hhes/www/income/newguidance.html#summary>.

## **Targeting performance for high burden households**

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

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

The study furnished the following information to ACF with respect to targeting of high energy burden households.<sup>37</sup>

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

In addition, the LIHEAP Energy Burden Evaluation Study 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 using the 2005 RECS.

## **Performance measurement statistics**

Table 4-1 shows the LIHEAP reciprocity targeting performance measures from FY 2003 through FY 2008. The first column in the table restates the performance goal. The second column shows

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<sup>37</sup> The study developed a definition of “high burden,” though the statute offers no such definition. The study’s definition is used here.

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 2008 targeting index scores fluctuated between 74 and 79. This indicates that there was no improvement over the baseline targeting index score in those years.

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 2008 targeting index scores show a decrease in targeting households with young children. However, the scores indicate that LIHEAP grantees are still effectively targeting households with young children although to a lesser degree for unknown reasons.

**Table 4-1. LIHEAP reciprocity targeting performance measures reported for FY 2003 – FY 2008**

Performance Measures	Fiscal Year	Target	Result
1A. Increase the reciprocity targeting index score of LIHEAP households having at least one member 60 years or older	FY 08	96	76
	FY 07	94	78
	FY 06	92	74
	FY 05	84	79
	FY 04	82	78
	FY 03	Baseline	79
1B. Maintain the reciprocity targeting index score of LIHEAP households having at least one member five years or younger	FY 08	122	110
	FY 07	122	110
	FY 06	122	115
	FY 05	122	113
	FY 04	122	115
	FY 03	Baseline	122

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

Table 4-2 shows the national and regional reciprocity targeting indexes for high home energy burden households for FY 2001 and FY 2005. The 2001 RECS, the 2001 RECS LIHEAP Supplement, and the 2005 RECS were used to develop these statistics. These statistics demonstrate that, except for the Northeast region in FY 2005, LIHEAP was targeting high burden households.<sup>38</sup> However, FY 2005

<sup>38</sup> 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 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.

targeting index scores indicate a significant decrease in targeting high burden households compared to the FY 2001 baseline scores.

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

Region	Reciprocity targeting index for high burden households – home energy	
	FY 2001	FY 2005
Northeast	163	99
Midwest	132	116
South	155	119
West	293	184
United States	170	122

The energy burden evaluation study also furnished estimates of the benefit and burden reduction targeting indexes for FY 2001. These indexes were updated for FY2005 using the 2005 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 were slightly lower at the national level and in most regions in FY 2005 compared to FY 2001. 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 FY2001 to FY2005, burden reduction index scores decreased for all regions.

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

Region	Benefit targeting index for high burden households – home energy	
	FY 2001	FY 2005
Northeast	103	104
Midwest	108	104
South	110	81
West	124	119
United States	109	101

**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, and for FY 2005 from the 2005 RECS**

Region	Burden reduction targeting index for high burden households – home energy	
	FY 2001	FY 2005
Northeast	96	74
Midwest	93	70
South	98	84
West	86	60
United States	94	71

## Uses of LIHEAP performance data

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

### LIHEAP grantee use of targeting indexes

Individual LIHEAP grantees can use the reciprocity targeting indexes to examine the effectiveness of their outreach to households with vulnerable members.<sup>39</sup>

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

Individual LIHEAP grantees can use the benefit and burden reduction targeting indexes to examine the effectiveness of their benefit determination procedures in serving households with vulnerable members and households with high energy burdens.<sup>40</sup>

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

<sup>39</sup> LIHEAP grantees have the ability to create these reciprocity targeting indexes using recipient counts from the State Household Reports and the estimated income eligibility counts provided in Appendix B of this report.

<sup>40</sup> 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.

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

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

## **Targeting performance measurement issues**

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

The major challenge is in finding an effective way to measure targeting indexes for vulnerable and high burden households in a timely way. In order to meet the information requirements for the ACF performance plan for LIHEAP, data need to be collected more frequently and delivered in a more timely way. The final *LIHEAP Household Report* needs to be made available to ACF earlier in the year. The RECS and the RECS LIHEAP Supplement need to be conducted more regularly and processed more quickly.

Starting with FY 2011, the LIHEAP Household Report will furnish an unduplicated count of households receiving all types of LIHEAP benefits. This will allow ACF to show the targeting of all



types of LIHEAP benefits, rather than just the targeting of heating benefits. Until FY 2011, however, ACF will be able to show only the targeting of heating benefits.

## V. LIHEAP Energy Insecurity Study

The 2005 Residential Energy Consumption Survey (RECS) is a national survey that collected energy-related data for occupied housing units and households. The Office of Community Services (OCS) in the Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services (HHS) funded a special set of questions for low income households responding to the 2005 RECS. Those questions collected information on residential and home energy-related problems faced by low income households and measured the extent to which households reported that participation in LIHEAP helped to ameliorate those problems.<sup>41</sup> This Section of the Notebook presents information on a study commissioned by OCS to conduct an exploratory analysis of the 2005 RECS data.<sup>42</sup>

### Study Goals

The RECS is a household energy survey that was first conducted in 1978 and has been periodically conducted since that time; the most recent survey was conducted in 2005. For most of the RECS surveys, HHS provided funding to improve the information available on low income home energy issues, including supplemental samples of low income households and LIHEAP-recipient households to increase the precision of survey estimates, and special questions related to LIHEAP reciprocity and the energy-related problems faced by low income households. For the 2005 RECS, HHS funding was used to oversample LIHEAP recipient households, obtain administrative data on LIHEAP reciprocity and benefits for survey respondents, and administer a set of questions on energy-related problems.

In the 2005 RECS, the questions on energy-related problems faced by low income households were based on a series of questions developed by Roger Colton of Fisher, Sheehan, and Colton. Colton originally developed the questions and the Home Energy Insecurity Scale in 2003 for OCS as a tool to describe the home energy status of LIHEAP income-eligible households.<sup>43</sup> Since that time, the questions and the Scale have been used in a number of studies, including the RECS.

The purpose of the study commissioned by OCS was to conduct an exploratory analysis of the 2005 RECS data to develop a better understanding of the performance of the survey questions and to develop new information on the Energy Insecurity<sup>44</sup> of low income households, including:

- Levels and Types of Energy Insecurity – Estimation of the rate at which low income households face various types of energy problems and examination of survey respondent reports on the extent to which energy assistance restores home heating and cooling for households experiencing service interruptions.

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<sup>41</sup> 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).

<sup>42</sup> *LIHEAP Special Study of the 2005 Residential Energy Consumption Survey – Dimensions of Energy Insecurity for Low Income Households*, February 2010, prepared by APPRISE Incorporated under contract #DE-AM01-04EI41006.

<sup>43</sup> Colton, R. (2003). “Measuring the Outcomes of Low-Income Energy Assistance Programs through a Home Energy Insecurity Scale.” A publication prepared for: LIHEAP Committee on Managing for Results. U.S. Department of Health and Human Services. Administration for Children and Families. Office of Community Services, Division of Energy Assistance.

<sup>44</sup> In the literature, Energy Insecurity is defined as the “lack of consistent access to enough of the kinds of energy needed for a healthy and safe life in the geographic area where a household is located.” (Cook et al., A Brief Indicator of Energy Security: Associations with Food Security, Child Health, and Child Development in US Infants and Toddlers. *Pediatrics*; Oct 2008, 122; e867-e875.)

- Factors Related to Energy Insecurity – An analysis of the factors associated with energy problems including poverty level, energy burden, geographic region and other demographic and housing factors.
- Performance of the Home Energy Insecurity Scale – An assessment of the performance of the Home Energy Insecurity Scale in measuring the impacts of energy costs on low income households compared to other Energy Insecurity measures used in the past.

This study furnishes important information to OCS regarding the types of information that could be collected to assess the energy needs of low income households.

## **Levels and Types of Energy Insecurity**

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

### **Space Heating Disruptions**

One problem that some low income households face when they are unable to pay their energy bills is that they go without energy service and are unable to heat their homes with their main heating equipment when heat is needed.<sup>45</sup> Questions on space heating disruptions have been asked on RECS surveys since 1982. While the format of the questions has changed somewhat over time, there is a consistent series of information on heating service disruptions from 1982 through 2005. In the 2005 RECS, the following space heating disruption questions were asked:

*K-3: Was there ever a time during the last 12 months when you wanted to use your main source of heat, but could not, for one or more of the following reasons:*

*K3a: Your heating system was broken and you were unable to pay for its repair or replacement?*

*K3b: You ran out of fuel oil, kerosene, propane (bottled gas), coal, or wood because you were unable to pay for a delivery?*

*K3c: The utility company discontinued your electric service because you were unable to pay your bill?*

*K3d: The utility company discontinued your gas service because you were unable to pay your bill?*

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

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<sup>45</sup> Note that the data does not provide information on the total number of shutoffs (e.g. spring shutoffs in moratoria States when heat is not needed) for the entire year.

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

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

Table 5-1 presents data from the 2005 RECS on space heating disruptions for low income households. The table shows the number and percent of low income households that experienced each type of space heating disruption. Table 5-1 shows that almost 1.6 million low income households had a space heating disruption because of the inability to pay for the repair of a broken heating system, and such disruptions affected 4.4 percent of the entire population of low income households.

**Table 5-1. Inability to use the main source of heat when heat is needed in the past 12 months for low income households, 2005**

Reason for Space Heating Disruption	Number of Low Income Households with Space Heating Disruption	Percent of All Low Income Households
Inability to pay for the repair of broken heating system	1,581,233	4.4%
Inability to pay for bulk fuel delivery	300,284	0.8%
Inability to pay for electric service	1,671,636	4.7%
Inability to pay for natural gas service	621,956	1.7%
Disruption due to any reason	3,265,563	9.1%

Source: 2005 RECS

Table 5-2 furnishes data from the series of RECS surveys regarding the number of low income households that have reported bill payment related space heating disruptions over time. These statistics show that during the winter of 2004-2005 bill payment related space heating disruptions were the highest of any year since the question was first asked in the 1984 RECS.<sup>46</sup>

**Table 5-2. Inability to use the main source of heat because of payment problems in the past 12 months for low income households, selected years**

Reason for Space Heating Disruption	Percent of All Low Income Households					
	1983-84	1987-88	1990-91	1996-97	2000-01	2004-05
Payment disruptions	5.1%	2.1%	4.1%	3.6%	2.7%	5.9%

Source: FY 2007 LIHEAP Home Energy Notebook and 2005 RECS

## **Air Conditioning Disruptions**

Another problem that some low income households face when they are unable to pay their energy bills is that they go without energy service and are unable to cool their homes with their air conditioning

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

equipment when cooling is needed.<sup>47</sup> Questions on air conditioning disruptions were included in RECS for the first time in the 2005 survey.

In the 2005 RECS, the following air conditioning disruption questions were asked:

*K-4: Was there ever a time during the last 12 months when you wanted to use your air conditioner, but could not, for one or more of the following reasons:*

*K4a: Your air conditioner was broken and you were unable to pay for its repair or replacement?*

*K4b: The utility company discontinued your electric service because you were unable to pay your bill?*

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

Table 5-3 presents data from the 2005 RECS on air conditioning disruptions for low income households. The table shows the number and percent of low income households that experienced each type of air conditioning disruption. Table 5-3 shows that over 1.2 million low income households had an air conditioning disruption because of the inability to pay for electric service, and such disruptions affected 3.5 percent of the entire population of low income households.

**Table 5-3. Inability to use air conditioning when cooling is needed in the past 12 months for low income households, 2005**

Reason for Air Conditioning Disruption	Number of Low Income Households with Air Conditioning Disruption	Percent of All Low Income Households
Inability to pay for the repair of broken air conditioner	1,427,509	4.0%
Inability to pay for electric service	1,240,278	3.5%
Disruption due to any reason	2,507,547	7.0%

Source: 2005 RECS

Air conditioning disruptions were evenly split between equipment disruptions and electric service disruptions. This indicates that households need both space cooling energy assistance and cooling equipment repair assistance.

## **Self-Reports on Impacts of Energy Assistance**

The 2005 RECS included questions on the role of energy assistance in restoring energy service for households experiencing heating or cooling disruptions. The households that experienced heating or cooling interruptions in the past year and reported on the survey that they received energy assistance were asked the following questions to assess the role of energy assistance in restoring the service for these households:

<sup>47</sup> Note that the data does not provide information on the total number of shutoffs (e.g. autumn shutoffs in moratoria States when cooling is not needed) for the entire year.

*K-3: Was there ever a time during the past 12 months when you wanted to use your main source of heat, but could not, for one or more of the following reasons:*

*K-3a: Your heating system was broken and you were unable to pay for its repair or replacement?*

*K-3a1: Did receiving energy assistance help you to restore heating of your home?*

*K-3b: You ran out of fuel oil, kerosene, propane (bottled gas), coal, or wood because you were unable to pay for a delivery?*

*K-3b1: Did receiving energy assistance help you to restore heating of your home?*

*K-3c: The utility company discontinued your electric service because you were unable to pay your bill?*

*K-3c1: Did receiving energy assistance help you to restore heating of your home?*

*K-3d: The utility company discontinued your gas service because you were unable to pay your bill?*

*K-3d1: Did receiving energy assistance help you to restore heating of your home?*

*K-4: Was there ever a time during the past 12 months when you wanted to use your air-conditioner, but could not, for one or more of the following reasons:*

*K-4a: Your air-conditioner was broken and you were unable to pay for its repair or replacement?*

*K-4a1: Did receiving energy assistance help you to restore cooling of your home?*

*K-4b: The utility company discontinued your electric service because you were unable to pay your bill?*

*K-4b1: Did receiving energy assistance help you to restore cooling of your home?*

Table 5-4 presents information on the percent of all low income households for which energy assistance restored home heating. The table shows that energy assistance restored home heating for 11 percent of all low income households that had a heating interruption because of the inability to pay for a broken heating system. Thirty-five percent of all low income households that had a heating interruption because of the inability to pay for bulk fuel delivery had their heating restored by energy assistance.

**Table 5-4. Heating interruptions: The role of energy assistance in restoring service, all low income households, 2005**

<b>Reason for Heating Interruption</b>	<b>Number of Low Income Households with Interruption</b>	<b>Number of Low Income Households Energy Assistance Restored Heating</b>	<b>Percent of All Low Income Households Energy Assistance Restored Heating</b>
Inability to pay for the repair of broken heating system	1,581,233	176,301	11%
Inability to pay for bulk fuel delivery	300,284	103,646	35%
Inability to pay for electric service	1,671,636	322,077	19%
Inability to pay for natural gas service	621,956	126,034	20%

Source: 2005 RECS

Table 5-5 presents information on the percent of all low income households for which energy assistance restored home cooling. The table shows that energy assistance restored home cooling for 16 percent of all low income households that had a cooling interruption because of the inability to pay for electric service.

**Table 5-5. Cooling interruptions: The role of energy assistance in restoring service, all low income households, 2005**

<b>Reason for Home Cooling Interruption</b>	<b>Number of Low Income Households with Interruption</b>	<b>Number of Low Income Households Energy Assistance Restored Cooling</b>	<b>Percent of All Low Income Households Energy Assistance Restored Cooling</b>
Inability to pay for the repair of broken air conditioner	1,427,509	4,084	<1%
Inability to pay for electric service	1,240,278	200,029	16%

Source: 2005 RECS

## **Electric Service Disruptions**

Some low income households have payment problems but do not lose their space heating or air conditioning services because termination restrictions or energy assistance helps them to maintain service during the heating season and/or the cooling season. However, such households are sometimes vulnerable to electric service disconnections. These disconnections may result in a risk of fire if households without electricity use candles for lighting. Questions on electric service disruptions were included in RECS for the first time in the 2001 survey and were expanded in the 2005 survey. In 2001, 0.9 million low income households reported that they had electric service disruptions. In 2005, an error in the survey administration procedures resulted in collection of insufficient data to estimate these statistics. However, if the electric service disruptions experienced the same percentage increase as the space heating disruptions, it can be estimated that 1.9 million low income households had electric service disruptions in 2005.

## Financial Dimensions of Energy Insecurity

The 2005 RECS also asked low income survey respondents questions related to the financial dimension of Energy Insecurity. The survey questions included:

*K-1: As a result of energy price increases, some households have faced challenges in paying home energy bills. The next set of questions is about challenges you may have faced. In the past 12 months did you almost every month, some months, only 1 or 2 months, or never do the following because there wasn't enough money for your home energy bill?*

*K1a: Did you worry that you wouldn't be able to pay your home energy bill?*

*K1b: Did you reduce your expenses for what you consider to be basic household necessities?*

*K1c: Did you borrow from a friend or relative to pay your home energy bill?*

*K1d: Did you skip paying your home energy bill or pay less than your whole home energy bill?*

*K1e: Did you have a supplier of your electric or home heating service threaten to disconnect your electricity or home heating fuel service, or discontinue making fuel deliveries?*

Table 5-6 presents data from the 2005 RECS on the financial elements of Energy Insecurity for low income households. For each type of financial insecurity, the table shows the percent of low income households that experienced that type of financial Energy Insecurity. The last row of Table 5-6 shows that 42.2 percent of low income households reported no financial insecurity, while 57.8 percent of low income households had at least one type of financial insecurity during the past 12 months. The most common types of financial insecurity are “worry about ability to pay” and “reduce spending for basic necessities.” Over half of low income households indicated that they experienced one or both of those insecurities at least once during 2005. However, it is interesting to note that about 39 percent of households say that they “worry about [their] ability to pay” and they “reduce spending for basic necessities,” while seven percent of households report that they “worry” but that they do not “reduce spending” and eight percent say that they “reduce spending” but do not “worry about [their] ability to pay.”

**Table 5-6. Financial Energy Insecurity in the past 12 months for low income households, 2005**

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

Source: 2005 RECS

It is clear that the heating and cooling disruption statistics understate the level of Energy Insecurity among low income households. While about 10 percent of households experience space heating disruptions, almost half of households reduce spending for basic necessities and over 20 percent of households have threats of service termination.



## Health and Safety Dimensions of Energy Insecurity

The 2005 RECS also asked low income survey respondents questions related to the health and safety dimensions of Energy Insecurity. The survey questions included:

*K-1: As a result of energy price increases, some households have faced challenges in paying home energy bills. The next set of questions is about challenges you may have faced. In the past 12 months did you almost every month, some months, only 1 or 2 months, or never do the following because there wasn't enough money for your home energy bill?*

*K1f: Did you close off part of your home because you couldn't afford to heat or cool it?*

*K1g: Did you keep your home at a temperature that you felt was unsafe or unhealthy at any time of the year?*

*K1h: Did you leave your home for part of the day because it was too hot or too cold?*

*K1i: Did you use your kitchen stove or oven to provide heat?*

Table 5-7 presents data from the 2005 RECS on the health and safety elements of Energy Insecurity for low income households. For each type of health and safety insecurity, the table shows the percent of low income households indicating how often they experienced each type of Energy Insecurity. Table 5-7 shows that 26.0 percent of low income households had at least one type of health and safety insecurity during the past 12 months. The most commonly reported type of Energy Insecurity is “closing off part of home.” However, for each of the listed types of Energy Insecurity, close to 10 percent of low income households report experiencing that problem.

**Table 5-7. Health and safety Energy Insecurity in the past 12 months for low income households, 2005**

Dimension	Almost Every Month	Some Months	1 or 2 Months	Never
Close off part of home	4.6%	6.4%	2.4%	86.6%
Keep home at unsafe temperature	1.8%	4.1%	2.5%	91.6%
Leave home for part of the day	1.0%	4.2%	3.6%	91.2%
Use stove or oven for heat	0.7%	4.9%	4.5%	89.9%
Any health or safety insecurity	6.3%	12.4%	7.3%	74.0%

Source: 2005 RECS

## Summary of Findings on the Incidence of Energy Insecurity

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

- Incidence – The data show that over two-thirds of low income households faced some type of Energy Insecurity during 2005.

- **Overlap** – Some households faced only one type of problem; but many others experienced multiple problems during the year.
- **Intensity** – The intensity of any dimension of Energy Insecurity was directly related to the number of types of Energy Insecurity faced by a low income household.

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

## **Factors Related to Energy Insecurity**

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

- **Census Region** – Northeast, Midwest, South, and West.
- **HHS Poverty guidelines** – At or below 100% of the poverty guidelines, above 100% and at or below 150%, and above 150% but at or below 60% of State median income.
- **Income** – Annual household income at or below \$10,000, above \$10,000 but at or below \$20,000, and above \$20,000.
- **Income Type** – Employment income, retirement income, public assistance income, or other income.
- **Vulnerability Group** – Elderly households, young child households, and other households.
- **Residential Energy Burden Group** – High burden, moderate burden, and low burden.
- **Home Energy Burden Group** – High burden, moderate burden, and low burden.

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

### **Energy Insecurity by Census Region**

Previous research has found that the South and West Census regions have higher rates of heating and cooling interruptions than the Northeast and Midwest regions.<sup>48</sup> Table 5-8 shows that data from the 2005 RECS are consistent with earlier findings; low income households in the South and West regions experience service interruptions at almost twice the rate of low income households in the Northeast and Midwest. (Note: These differences are statistically significant at the 90% confidence level.)

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<sup>48</sup> It was hypothesized that the differences in heating and cooling interruptions were due to the existence of winter and summer moratoria in Northeast and Midwest Census regions.

**Table 5-8. Type of service interruptions in the past 12 months for low income households by Census region, 2005**

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

Source: 2005 RECS

With the information available from the 2005 RECS, it is possible to examine other dimensions of Energy Insecurity for low income households. Table 5-9 presents information on one dimension of financial energy insecurity: reducing expenses for household necessities because of the cost of residential energy. Table 5-10 presents information on one dimension of health and safety energy insecurity: keeping the home at an unsafe or unhealthy temperature because of the cost of residential energy. These tables are illustrative of the analysis in the full report on this study.

Table 5-9 shows that about half of low income households in the Midwest, South, and West regions reported that they had to reduce spending for household necessities because of the cost of residential energy. In the Northeast, the incidence was somewhat lower; about 40 percent of households reported that they had to reduce spending for household necessities. This difference is statistically significant at the 90% confidence level. This is different from the analysis of service interruptions where both the Northeast and Midwest regions had lower rates of interruptions; in this analysis the Northeast region has a lower incidence than the South and West regions, but the Midwest region has the same incidence as the South and West regions.

**Table 5-9. Reduced expenses in the past 12 months for low income households by Census region, 2005**

Dimension	Frequency	Census Region				U.S.
		Northeast	Midwest	South	West	
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	12.4%	15.7%	20%	18.1%	17.0%
	Some Months	20.5%	27.3%	22.9%	22.0%	23.3%
	1 or 2 Months	6.1%	6.3%	6.7%	8.0%	6.7%
	Never / No	61.0%	50.7%	50.5%	51.8%	53.0%

Source: 2005 RECS

Table 5-10 shows that low income households in the Northeast region were less likely to report that they had to keep their home at a temperature that they felt was unsafe or unhealthy; 5.7 percent of households in the Northeast reported unhealthy or unsafe temperatures, while 10.1 percent of the low income households in the South region reported that problem. This difference is statistically significant at the 90% confidence level.

**Table 5-10. Kept home at unsafe temperature in the past 12 months for low income households by Census region, 2005**

Dimension	Frequency	Census Region				U.S.
		Northeast	Midwest	South	West	
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	1.3%	1.0%	2.8%	1.5%	1.8%
	Some Months	2.6%	4.0%	4.9%	4.2%	4.1%
	1 or 2 Months	1.8%	3.5%	2.5%	2.0%	2.5%
	Never / No	94.3%	91.5%	89.9%	92.3%	91.6%

Source: 2005 RECS

In previous research studies, it has been hypothesized that winter service termination restrictions in the Northeast and Midwest regions might result in lower rates of heating service interruptions. These new findings, showing that low income households appear to have a lower incidence of energy-related problems in the Northeast region, might result from those or other factors. One possible explanation is that the Northeast region has more funding for LIHEAP and ratepayer low-income energy assistance programs than other regions.

### **Energy Insecurity by Poverty Guidelines**

Previous research has found that households with income at or below 100% of the HHS poverty guidelines have higher rates of heating and cooling interruptions than households with higher incomes. Table 5-11 shows that data from the 2005 RECS are consistent with earlier findings; households with income at or below 100% of the HHS poverty guidelines experience service interruptions at a higher rate than low income households with income above 100 percent of the HHS poverty guidelines. These differences are statistically significant at the 90% confidence level.

**Table 5-11. Type of service interruption in the past 12 months for low income households by the poverty guidelines, 2005**

Type of Interruption	Poverty Group		
	<=100%	>100%-150%	>150%
Heating Interruption	12.9%	7.0%	5.5%
Cooling Interruption	10.1%	8.6%	6.1%
Any Interruption	14.5%	10.0%	8.3%

Source: 2005 RECS

Table 5-12 shows that 52.7 percent of the households with income at or below 100% of poverty reduced spending for household necessities at some point during the year, compared to 37.9 percent of households with incomes above 150 percent of poverty. This difference is statistically significant at the 90% confidence level. While Table 5-12 does show that the lowest income households have the highest rate of financial energy insecurity, it also shows that a significant share of households with income above 150 percent of the HHS poverty guidelines reported that they reduced spending on household necessities because of the cost of residential energy.

**Table 5-12. Reduced expenses in the past 12 months for low income households by the poverty guidelines, 2005**

Dimension	Frequency	Poverty Group		
		<=100%	>100%-150%	>150%
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	22.4%	14.1%	11.2%
	Some Months	22.3%	26.2%	20.8%
	1 or 2 Months	8.0%	5.6%	6.0%
	Never / No	47.3%	54.2%	62.1%

Source: 2005 RECS

Table 5-13 shows that low income households with income at or below the HHS poverty guidelines were more likely to report that they had to keep their home at a temperature that they felt was unsafe or unhealthy; 12.1 percent of households with income at or below the poverty level reported that, while 4.4 percent of the households with income above 150 percent of the poverty level reported that. This difference is statistically significant at the 90% confidence level.

**Table 5-13. Kept home at unsafe temperature in the past 12 months for low income households by the poverty guidelines, 2005**

Dimension	Frequency	Poverty Group		
		<=100%	>100%-150%	>150%
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	2.9%	0.6%	1.3%
	Some Months	5.4%	4.3%	1.2%
	1 or 2 Months	3.8%	1.3%	2.0%
	Never / No	87.9%	93.7%	95.6%

Source: 2005 RECS

### **Energy Insecurity by Vulnerability Group**

Previous research has found that elderly households have lower rates of heating and cooling interruptions than other types of households. Table 5-14 shows that data from the 2005 RECS are consistent with earlier findings; elderly households with income at or below 100 percent of the HHS poverty guidelines have a lower rate of interruptions than young child and other low income households with income at or below 100 percent of the HHS poverty guidelines. While the difference between elderly and other households is statistically significant at the 90% confidence level, the difference between elderly and young child households is not. That is not to say that elderly households do not experience service interruptions; in 2005, over 10 percent of elderly households with incomes at or below 100 percent of the HHS poverty guidelines had either heating and/or cooling service interruptions. However, they experienced those interruptions at a lower rate than other low income households.

**Table 5-14. Type of service interruption in the past 12 months by vulnerability group, households with income at or below 100% of HHS poverty guidelines, 2005**

Type of Interruption	Vulnerability Group		
	Young Child	Elderly	Other
Heating Interruption	12.6%	9.2%	16.2%
Cooling Interruption	12.2%	7.5%	11.2%
Any Interruption	14.3%	10.5%	18.0%

Source: 2005 RECS

Table 5-15 shows that 47.5 percent of the elderly households with income at or below 100% of poverty reduced spending for household necessities at some point during the year, compared to 55.8 percent of young child households and 55.3 percent of other households with incomes at or below 100 percent of poverty. However, this difference is not statistically significant at the 90% confidence level.

**Table 5-15. Reduced expenses in the past 12 months by vulnerability group, households with income at or below 100% of HHS poverty guidelines, 2005**

Dimension	Frequency	Vulnerability Group		
		Young Child	Elderly	Other
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	18.9%	20.3%	26.0%
	Some Months	24.0%	21.1%	22.4%
	1 or 2 Months	12.9%	6.1%	6.9%
	Never / No	44.2%	52.5%	44.7%

Source: 2005 RECS

Table 5-16 shows that elderly households with income at or below the HHS poverty guidelines were more likely to report that they had to keep their home at a temperature that they felt was unsafe or unhealthy; 14.5 percent of elderly households reported that, while 9.3 percent of young child households and 11.6 percent of other households reported that. However, this difference is not statistically significant at the 90% confidence level.

**Table 5-16. Kept home at unsafe temperature in the past 12 months by vulnerability group, households with income at or below 100% of HHS poverty guidelines, 2005**

Dimension	Frequency	Vulnerability Group		
		Young Child	Elderly	Other
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	1.6%	5.6%	1.4%
	Some Months	4.4%	5.2%	6.2%
	1 or 2 Months	3.2%	3.8%	4.0%
	Never / No	90.7%	85.5%	88.4%

Source: 2005 RECS

### **Energy Insecurity by Energy Burden Group**

Previous research has found that households with the highest residential energy burdens have higher highest rates of heating and cooling interruptions than other types of households. Table 5-17 shows that

data from the 2005 RECS are consistent with earlier findings; households with high residential energy burden<sup>49</sup> have a higher rate of interruptions than moderate burden and low burden households.<sup>50</sup> While the difference for heating interruptions is statistically significant at the 90% confidence level, the difference for cooling interruptions is not. That is not to say that lower burden households do not experience service interruptions; in 2005, over 10 percent of moderate burden households and almost 10 percent of low burden households had heating and/or cooling service interruptions. However, they experienced those interruptions at a lower rate than the high burden households.

**Table 5-17. Type of service interruption in the past 12 months for low income households by energy burden group, 2005**

Type of Interruption	Residential Energy Burden		
	High	Moderate	Low
Heating Interruption	12.7%	7.4%	7.2%
Cooling Interruption	9.7%	8.7%	7.4%
Any Interruption	14.2%	10.7%	9.5%

Source: 2005 RECS

Table 5-18 shows that high and moderate energy burden households have a similar incidence for reduced spending for household necessities at some point during the year; 51.1 percent of high burden households and 49.0 percent of moderate burden households reported reducing spending for household necessities at some point during the year, compared to 40.4 percent of low burden households. While the difference between high burden and moderate burden households is not statistically significant at the 90% confidence level, the difference between moderate burden and low burden households is statistically significant.

**Table 5-18. Reduced expenses in the past 12 months for low income households by energy burden group, 2005**

Dimension	Frequency	Residential Energy Burden		
		High	Moderate	Low
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	20.7%	18.4%	11.5%
	Some Months	25.2%	22.1%	22.3%
	1 or 2 Months	5.2%	8.5%	6.7%
	Never / No	48.9%	51.0%	59.6%

Source: 2005 RECS

<sup>49</sup> This study defines high energy burden as the “energy share” of severe housing (shelter) burden. Severe housing burden is considered by some researchers to be 50% of income. (See Cushing N. Dolbear. 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 defines 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.

For more information, the reader can refer to “LIHEAP Energy Burden Evaluation Study,” available on OCS’ LIHEAP website at: [www.acf.hhs.gov/programs/ocs/liheap/program\\_stats/study-July\\_05.doc](http://www.acf.hhs.gov/programs/ocs/liheap/program_stats/study-July_05.doc).

<sup>50</sup> By comparison, there was no relationship when home energy burden is used instead of residential energy burden.

Table 5-19 shows that high and moderate energy burden households have a similar incidence for reporting that they had to keep their home at a temperature that they felt was unhealthy or unsafe at point during the year; 10.7 percent of high burden households and 8.9 percent of moderate burden households reported that, compared to 5.2 percent of low burden households. While the difference between high burden and moderate burden households is not statistically significant at the 90% confidence level, the difference between moderate burden and low burden households is statistically significant.

**Table 5-19. Kept home at unsafe temperature in the past 12 months for low income households by energy burden group, 2005**

Dimension	Frequency	Residential Energy Burden		
		High	Moderate	Low
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	2.3%	1.5%	1.5%
	Some Months	5.4%	4.5%	2.2%
	1 or 2 Months	3.0%	3.0%	1.5%
	Never / No	89.3%	91.1%	94.8%

Source: 2005 RECS

## Multivariate Analysis of Factors

The tabulations show how the incidences of certain kinds of energy problems vary for key population subgroups. However, these tabulations cannot control for all factors at the same time. For example, Table 5-9 shows that households in the Northeast region were less likely to report that they reduced spending for household necessities than households in other regions. However, Table 5-13 shows that households with annual income that exceeds 150 percent of the HHS poverty guidelines were also less likely to report that they reduced spending for household necessities. Since a larger share of households in Northeast region have incomes that exceed 150 percent of the HHS poverty guidelines than households in other regions, the tabular analysis unable to ascertain whether, in fact, the regional differences in this variable are due to the higher income of low income households in the Northeast region, or due to other factors such as service termination restrictions.<sup>51</sup>

To examine these issues, the study used multiple regression analysis<sup>52</sup> to examine the effects of these factors on Energy Insecurity of LIHEAP income eligible households. Multiple regression analysis allows one to discriminate between the effects of the explanatory variables, making allowance for the fact that they may be correlated. The regression coefficient of each explanatory variable provides an estimate of its influence on Energy Insecurity, controlling for the effects of all the other explanatory variables included in the model.

<sup>51</sup> According to the 2005 CPS ASEC, using the federal maximum LIHEAP income guidelines, the percentage of LIHEAP income eligible households with annual income that exceeds 150 percent of the HHS poverty guidelines was 41.0% in the Northeast; 36.9% in the Midwest; 34.2% in the West; and 24.8% in the South Census region in 2005. Regional differences are statistically significant at the 90% confidence level.

<sup>52</sup> Regression analysis is a statistical tool for evaluating the relationship of one or more independent variables to a single 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). For example, a dependent variable for this study would be an indicator variable taking the value of 1 if a household reports having financial Energy Insecurity and 0 if the household reports otherwise. The explanatory variables would be Census Region indicators, poverty level, residential (or home) energy burden, presence of an elderly or young child member in the household, and whether the household uses bulk fuel.



In general, the multivariate analysis of data confirmed the findings from the tabular analysis. However, there were two important differences between the tabular analysis and the regression analysis.

- **Regional Differences in Financial Energy Problems** – The tabular analysis showed that low income households in the Northeast region reported a lower incidence of financial energy problems than households in other regions. However, the regression analysis shows that, when other factors are controlled, low income households in different Census regions were likely to experience similar rates of financial energy problems.
- **Incidence of Health and Safety Problems for Elderly Households** – The tabular analysis showed that elderly households were more likely to report health and safety problems than other types of households. However, when other factors are controlled for, it appears that elderly households have a lower rate of health and safety problems.

The multivariate analysis also can furnish information on what factors appear to have the strongest relationship to energy problems of all types. The analysis found that residential energy burden and household poverty level have the strongest relationship to energy problems. Households with higher residential energy burden and households with lower income as a percent of the HHS poverty guidelines are most likely to report that they experience energy-related problems.

Most findings from the multivariate analyses were consistent with the findings from the tabular analyses of the data. Therefore, in general, the reader can rely on the results from the tabular analyses. However, notable exceptions such as the incidence of health and safety problems reported by elderly households need to be considered.

## **Home Energy Insecurity Scale**

Colton originally developed the Home Energy Insecurity Scale in 2003 for OCS as a tool to describe the home energy status of LIHEAP income-eligible households.<sup>53</sup> The Scale combines information obtained from various Energy Insecurity questions into a single measure that can characterize the energy needs of low income households. Based on responses to these questions, households are placed in one of the five thresholds:

- *A **thriving** household is one that has achieved generally accepted standards of well-being. A thriving household can engage in the full range of home energy uses of its choice without outside assistance and without financial strain.*
- *A **capable** household is secure, even though not having achieved the full range of generally accepted standards of well-being.*
- *A **stable** household does not face significant threats and is unlikely to be in immediate crisis. A stable household may on infrequent occasion need to engage in temporary or inappropriate actions because it lacks money to pay its home energy bills, but it does not do so regularly.*
- *A **vulnerable** household is one that is not in immediate danger, but that may avoid this danger only through temporary or inappropriate solutions. A vulnerable household may occasionally*

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<sup>53</sup> Colton, R. (2003). "Measuring the Outcomes of Low-Income Energy Assistance Programs through a Home Energy Insecurity Scale." A publication prepared for: LIHEAP Committee on Managing for Results. U.S. Department of Health and Human Services. Administration for Children and Families. Office of Community Services, Division of Energy Assistance.

*face energy choices that require it to compromise not merely on comfort and/or convenience, but on basic household energy needs such as heating and/or hot water.*

- *An **in-crisis** household faces immediate needs that threaten the household's physical and/or emotional safety. Three alternative conditions exist of which anyone might place someone in the "in-crisis" threshold: (1) the household goes without energy; or (2) the household has energy, but has to routinely compromise on its energy use for basic household necessities; or (3) the household does not compromise on its energy use, but in order to maintain that energy use, must compromise on non-energy basic necessities.*

The Home Energy Insecurity Scale was initially developed as a tool for caseworkers to assess the energy needs of low income households. APPRISE subsequently collaborated with Colton and developed a modified set of questions. The modified instrument can be used by interviewers, and allows a systematic and automated assessment of Energy Insecurity based on survey responses. The 2005 RECS questionnaire used this modified set of questions. The response categories used to classify households on the 2005 RECS Home Energy Insecurity Scale are given in Table 5-20.

**Table 5-20. 2005 RECS Home Energy Insecurity Scale**

	Thriving	Capable	Stable	Vulnerable	In-Crisis
<b>Receipt of Outside Assistance</b>					
K-1c. Did you need to borrow from a friend or relative to pay your home energy bill?	Never	Some months	Some months	Almost every month	Almost every month
<b>Constraints on Energy Use</b>					
K-1f. Did you close off part of your home because you could not afford to heat or cool it?	Never	1 or 2 months	Some months	Almost every month	Almost every month
K-1g. Did you keep your home at a temperature that you felt was unsafe or unhealthy at any time of the year?	Never	Never	1 or 2 months	Some months	Almost every month
K-1h. Did you leave your home for part of the day because it was too hot or too cold?	Never	Never	1 or 2 months	Some months	Almost every month
K-1i. Did you use your kitchen stove or oven to provide heat?	Never	Never	Never	1 or 2 months	Some months
<b>Constraints on Household Necessities</b>					
K-1b. Did you reduce your expenses for what you consider to be basic household necessities?	Never	Never	Never	Some months	Almost every month
<b>Nonpayment on Energy Bills</b>					
K-1d. Did you skip paying your home energy bill or pay less than your whole home energy bill?	Never	1 or 2 months	Some months (combined with "never" in K-1e)	Some months	Almost every month
K-1e. Did you have a supplier of your electric or home heating service threaten to disconnect your electricity or home heating fuel service or discontinue making fuel deliveries?	Never	Never	Never	Some months	Almost every month
K-6. Was your electricity ever discontinued because you were unable to pay your electric bill?	No	No	No	No	Yes
K-3b. Was there ever a time that you wanted to use your main source of heat but could not because you ran out of fuel oil, kerosene, LPG, propane, coal, or wood because you were unable to pay for a delivery?	No	No	No	No	Yes
K-3d. Was there ever a time that you wanted to use your main source of heat but could not because the utility company discontinued your gas service because you were unable to pay your bill?	No	No	No	No	Yes
K-3c. Was there ever a time that you wanted to use your main source of heat but could not because the utility company discontinued your electric service because you were unable to pay your bill?	No	No	No	No	Yes
K-4b. Was there ever a time that you wanted to use your air conditioner but could not because the utility company discontinued your electric service because you were unable to pay your bill?	No	No	No	No	Yes
<b>Financial Strain</b>					
K-1a. Did you worry that you wouldn't be able to pay your home energy bill?	Never	1 or 2 months	Almost every month	Almost every month	Almost every month

## Geographic and Demographic Factors for Energy Insecurity

The study examined how Energy Insecurity as measured by the Home Energy Insecurity Scale varied by region and by demographic group. Tables 21 through 25 highlight the major findings from that analysis.

Table 5-21 shows the Scale classification of LIHEAP income eligible households by Census region. Nationally, approximately 25 percent (9.2 million) of such households are classified as in-crisis, 28 percent (10.1 million) as vulnerable, and about 40 percent (14.3 million) as thriving. Households in the South and West are most likely to be in-crisis. Households in the West are least likely to be thriving. A very small proportion of households are classified as either capable or stable in each census region.

**Table 5-21. 2005 RECS Home Energy Insecurity Scale for low income households by Census region, 2005**

Threshold	Census Region				U.S.
	Northeast	Midwest	South	West	
Thriving	46.9%	38.0%	39.4%	34.5%	39.6%
Capable	2.3%	2.6%	3.5%	4.3%	3.2%
Stable	5.2%	4.9%	2.4%	2.8%	3.6%
Vulnerable	27.4%	32.8%	24.6%	29.0%	28.0%
In-Crisis	18.2%	21.8%	30.2%	29.4%	25.6%
TOTAL	100%	100%	100%	100%	100%

Source: 2005 RECS

Table 5-22 shows the Scale classification of LIHEAP income eligible households by poverty level. More than 60 percent of households with incomes below poverty (9.6 million) are either vulnerable or in-crisis. The likelihood of being in-crisis decreases as poverty level increases.

**Table 5-22. 2005 RECS Home Energy Insecurity Scale for low income households by the poverty guidelines, 2005**

Threshold	Poverty Group		
	<=100%	>100%-150%	>150%
Thriving	32.7%	42.9%	48.2%
Capable	3.1%	3.4%	3.2%
Stable	3.2%	4.1%	3.9%
Vulnerable	27.5%	28.9%	27.5%
In-Crisis	33.6%	20.8%	17.3%
TOTAL	100%	100%	100%

Source: 2005 RECS

Table 5-23 shows the Scale classification of households below poverty by vulnerability group. About 68 percent of young child households are either vulnerable or in-crisis compared to about 53 percent of elderly households. This difference is statistically significant at the 90% confidence level.

**Table 5-23. 2005 RECS Home Energy Insecurity Scale for low income households by vulnerability group for households below poverty, 2005**

Threshold	Vulnerability Group		
	Young Child	Elderly	Other
Thriving	24.1%	42.7%	29.1%
Capable	2.7%	3.4%	3.0%
Stable	5.4%	1.1%	3.7%
Vulnerable	37.6%	25.3%	23.7%
In-Crisis	30.2%	27.5%	40.5%
TOTAL	100%	100%	100%

Source: 2005 RECS

Table 5-24 shows the Scale classification of LIHEAP income eligible households by residential energy burden. The households with the highest residential energy burden are most likely to be categorized as being in-crisis.

**Table 5-24. 2005 RECS Home Energy Insecurity Scale for low income households by residential energy burden, 2005**

Threshold	Residential Energy Burden		
	High	Moderate	Low
Thriving	35.5%	38.3%	45.7%
Capable	2.8%	3.1%	3.8%
Stable	3.5%	3.5%	3.8%
Vulnerable	27.3%	30.2%	26.5%
In-Crisis	31.0%	24.8%	20.2%
TOTAL	100%	100%	100%

Source: 2005 RECS

In general, the findings from the analysis of the Home Energy Insecurity Scale are consistent with the findings from the tabular analysis. The main benefit of the Scale is that it offers a way to examine all of the energy-related problems at one time. As such, the Home Energy Insecurity Scale could be used as an outcome performance measure for LIHEAP.

### **Issues with the Home Energy Insecurity Scale**

The Home Energy Insecurity Scale is a convenient way of combining information from the Energy Insecurity questions into one measure that characterizes the energy needs of the low income population. However, one issue for the 2005 RECS Home Energy Insecurity Scale is that most low income households are categorized as *thriving*, *vulnerable*, or *in-crisis*, while very few are categorized in the *capable* and *stable* categories. If so few households are categorized as *capable* or *stable*, it raises questions as to whether either is a meaningful way to characterize the Energy Insecurity of households. The study investigated this question by reviewing the Energy Insecurity questions and examining the sensitivity of household status to minor changes in the categorization procedures.

The study investigated the underlying factors that place households in *vulnerable* and *in-crisis* status on the Scale and tested the impact of revising the classification of households based on the responses to the following questions:

- *Did you need to borrow from a friend or relative to pay your home energy bill?*
- *Did you close off part of your home because you could not afford to heat or cool it?*
- *Did you worry that you wouldn't be able to pay your home energy bill?*
- *Did you have a supplier of your electric or home heating service threaten to disconnect your electricity or home heating fuel service or discontinue making fuel deliveries?*
- *Did you reduce your expenses for what you consider to be basic household necessities?*

In this modified classification, a household can be *capable* if it closes off part of its home for some months and *stable* if it does it for almost every month. The question about financial strain is used only to separate thriving households from the rest. A household can still be *stable* if it receives a shutoff notice or threat for 1 or 2 months but does not actually experience a shutoff.

The question about the reduction in expenditures on household necessities does not clearly specify the types of necessities. About half of the RECS respondents said that they reduced their expenditures on household necessities in order to pay for their energy bills. The Scale places all of these households into either *vulnerable* or *in-crisis* categories. This study proposes a different classification based on this question that moves some households into *stable* and *capable* thresholds.

Moreover, the households that were identified as LIHEAP recipients from the State administrative data were classified as *capable* instead of *thriving* on the Modified Home Energy Insecurity Scale even though these households answered each and every question on the Scale as “never” or “no.”

The response categories used to classify households on the Modified Home Energy Insecurity Scale are given in Table 5-25. The changes from the 2005 RECS Home Energy Insecurity Scale are also highlighted in the table.

**Table 5-25. Modified Home Energy Insecurity Scale**

	Thriving	Capable	Stable	Vulnerable	In-Crisis
<b>Receipt of Outside Assistance</b>					
K-1c. Did you need to borrow from a friend or relative to pay your home energy bill?	Never	1 or 2 months	Some months	Almost every month	Almost every month
<b>Constraints on Energy Use</b>					
K-1f. Did you close off part of your home because you could not afford to heat or cool it?	Never	Some months	Almost every month	Almost every month	Almost every month
K-1g. Did you keep your home at a temperature that you felt was unsafe or unhealthy at any time of the year?	Never	Never	1 or 2 months	Some months	Almost every month
K-1h. Did you leave your home for part of the day because it was too hot or too cold?	Never	Never	1 or 2 months	Some months	Almost every month
K-1i. Did you use your kitchen stove or oven to provide heat?	Never	Never	Never	1 or 2 months	Some months
<b>Constraints on Household Necessities</b>					
K-1b. Did you reduce your expenses for what you consider to be basic household necessities?	Never	Some months	Almost every month	Almost every month	Almost every month
<b>Nonpayment on Energy Bills</b>					
K-1d. Did you skip paying your home energy bill or pay less than your whole home energy bill?	Never	1 or 2 months	Some months	Almost every month	Almost every month
K-1e. Did you have a supplier of your electric or home heating service threaten to disconnect your electricity or home heating fuel service or discontinue making fuel deliveries?	Never	Never	1 or 2 months	Some months	Almost every month
K-6. Was your electricity ever discontinued because you were unable to pay your electric bill?	No	No	No	No	Yes
K-3b. Was there ever a time that you wanted to use your main source of heat but could not because you ran out of fuel oil, kerosene, LPG, propane, coal, or wood because you were unable to pay for a delivery?	No	No	No	No	Yes
K-3d. Was there ever a time that you wanted to use your main source of heat but could not because the utility company discontinued your gas service because you were unable to pay your bill?	No	No	No	No	Yes
K-3c. Was there ever a time that you wanted to use your main source of heat but could not because the utility company discontinued your electric service because you were unable to pay your bill?	No	No	No	No	Yes
K-4b. Was there ever a time that you wanted to use your air conditioner but could not because the utility company discontinued your electric service because you were unable to pay your bill?	No	No	No	No	Yes
<b>Financial Strain</b>					
K-1a. Did you worry that you wouldn't be able to pay your home energy bill?	Never	Almost every month	Almost every month	Almost every month	Almost every month

Table 5-26 shows the classification of low income households on the 2005 RECS Home Energy Insecurity Scale and the Modified Scale. The Modified Scale classifies a significantly larger percentage of households as “capable” or “stable” compared to the 2005 RECS Scale.

**Table 5-26. Home Energy Insecurity Scale, percent of low income households in each classification threshold**

Threshold	2005 RECS Scale	Modified Scale
Thriving	39.6%	38.5%
Capable	3.2%	18.2%
Stable	3.6%	17.0%
Vulnerable	28.0%	12.5%
In-Crisis	25.6%	13.9%
TOTAL	100%	100%

Source: 2005 RECS

The study showed that a modified classification of households on the Scale is more consistent with the Scale’s threshold definitions. The findings from the analysis suggest that, if OCS decides to use the Home Energy Insecurity Scale as an outcome performance measure, additional analysis of the Scale should be conducted to ensure that the Scale is meaningful in terms of its classification of the energy needs of low income households. These findings are consistent with the study recommendations of Colton (2003). With regard to important questions or issues about the Home Energy Insecurity Scale, Colton (2003) notes the following:

*No question exists but that many issues presented by the Home Energy Insecurity Scale will need to be worked out during implementation. As specific issues arise, and are resolved, the scale will be modified. So, too, there will likely be a need to revisit the scale as evaluators and analysts begin to take data developed through the Home Energy Insecurity Scale and assess what lessons are to be found.*

## Study Implications

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

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



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

## **Types and Levels of Energy Insecurity**

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

- *Heating and Cooling Service Interruptions* - Tracking the levels of home heating and cooling service interruptions continues to be an important purpose of the RECS. The time series of RECS data shows that the 2005 space heating interruption rate was the highest measured since the question was added to the RECS in 1984.
- *Role of Energy Assistance in Restoring Service* – Adding questions on whether energy assistance was successful in helping to restore heating and air conditioning provides the ability to document one important outcome indicator for LIHEAP.
- *Financial Energy Insecurity* – The inclusion of questions that document financial Energy Insecurity for low income households provides a much better understanding of the extent to which energy costs affect low income households; the statistics show that almost 60 percent of low income households face financial Energy Insecurity and that about one-fourth of those households face financial Energy Insecurity “almost every month.”
- *Health and Safety Energy Insecurity* – The inclusion of questions that document health and safety Energy Insecurity for low income households gives additional information on the other ways that energy affordability problems can affect low income households. Overall, about one-fourth of low income households experienced health and safety Energy Insecurity. Moreover, about 90 percent of the households that reported health and safety Energy Insecurity did not report heating or air conditioning interruptions, indicating that the questions from previous RECS on interruptions alone were not capturing the entire set of risks faced by low income households because of energy affordability problems.

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

## **Factors Related to Energy Insecurity**

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

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

financial Energy Insecurity, they report similar rates of health and safety Energy Insecurity. Since it is harder to directly observe health and safety Energy Insecurity, local LIHEAP intake offices may need to conduct more extensive outreach to identify such households.

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

## **Home Energy Insecurity Scale**

The 2005 RECS furnishes the first opportunity to estimate Energy Insecurity for all low income households. This study furnishes the following three important findings with respect to the Scale and its uses:

1. *LIHEAP Targeting* – The Home Energy Insecurity Scale allows for LIHEAP program managers to see what groups of households are at greater risk for problems resulting from energy unaffordability. By targeting such households, program managers may be able to increase the effectiveness of LIHEAP.
2. *Performance Measurement* – It is clear that some low income households have a higher level of Energy Insecurity than others. It may be appropriate for LIHEAP to use the reduction in Energy Insecurity as an outcome performance measure for LIHEAP.
3. *Study and Analysis* – However, there are some important questions about the Home Energy Insecurity Scale. In particular, it is important to measure how the different levels of Home Energy Insecurity relate to the long term health and well-being of low income households. For that reason, it would be appropriate for OCS to continue to study the Home Energy Insecurity Scale and its policy implications.

The 2005 RECS furnishes a rich database of information on the energy needs of low income households. By supplementing heat interruptions questions with questions on the broader range of energy problems, the Survey has given policymakers much better information on the impacts of energy affordability.

## Appendix A: Home Energy Estimates

Appendix A provides information on how estimates of home energy data were derived from the 2005 Residential Energy Consumption Survey (RECS) and updated for FY 2008. 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.<sup>54</sup>

The 2005 RECS is the twelfth survey in the series of surveys.<sup>55</sup> For the 2005 RECS, 4,382 households were interviewed, including 443 verified LIHEAP recipient households. For the tabulations in this *Notebook*, 2005 RECS consumption and expenditure data were updated using price and weather data to represent consumption and expenditures for FY 2008.

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<sup>54</sup>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).

<sup>55</sup>For 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 2005 RECS are available from the EIA website: *Residential Energy Consumption Survey – home energy uses and costs*, Energy Information Administration, <http://www.eia.doe.gov/emeu/recs/contents.html>.

## **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 2005 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 2005 RECS data provide the most current and comprehensive data on residential energy use by low income households, several significant limitations must be addressed:<sup>56</sup>

- The 2005 RECS data for calendar year 2005 were updated to FY 2008 (October 1, 2007 to September 30, 2008), using procedures that adjust the 2005 data to reflect the weather and fuel prices for FY 2008. These procedures are comparable to those used for the FY 1986 - FY 2007 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 predicted on 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

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<sup>56</sup>Information about the quality of RECS data is available from the EIA website: *Residential Energy Consumption Survey – home energy uses and costs*, Energy Information Administration, <http://www.eia.doe.gov/emeu/recs/contents.html>.

collecting income data result in more accurate income data than RECS income data. Therefore, the 2008 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*.

- Households were classified in the 2005 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 include survey respondents who were reported as LIHEAP recipients by 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 2008 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 2005 RECS sample case using FY 2008 heating degree days, cooling degree days, and price inflators applied to the original expenditure data, as well as the regression formula developed from the 2005 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.<sup>57</sup>

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<sup>57</sup>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.<sup>58</sup> 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. First, the ratio of energy expenditures to annual income for each household in a specified population is computed. Then, the mean of these energy burden ratios is computed for the population.<sup>59</sup> For example, consider the situation where there are four households with energy burdens of 4, 5, 7, and 8 percent. 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. First, total energy expenditures for households and total annual income for households in a specified population are computed. 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. 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 2005 RECS, the mean residential energy burden for all LIHEAP Federally eligible households, in 2005, using the first approach was 12.9 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.<sup>60</sup> 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.

## **Statistical measures**

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 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).

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 12.9 percent. The median of the distribution of residential energy burdens from the 2005 RECS survey was 8.8 percent. The disparity between these two statistics is the result of the skewed distribution of

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<sup>58</sup>The mean is the sum of all values divided by the number of values. The mean is also referred to as the average.

<sup>59</sup>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.

<sup>60</sup>For example, 2005 RECS households with incomes of \$10,000 or less had average residential energy expenditures of \$1,357, while those with incomes between \$20,000 - \$35,000 had average residential energy expenditures of \$1,601. Thus, households which had more than twice as much income spent only 18 percent more on energy.

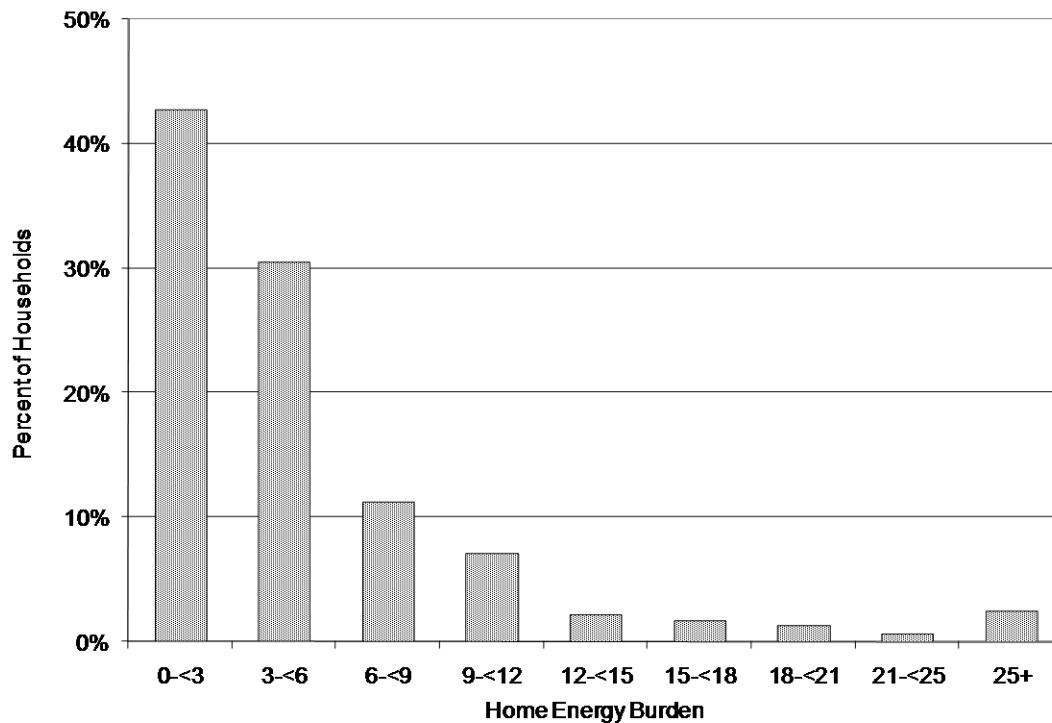
energy burden ratios. Figure A-1 demonstrates a skewed distribution of LIHEAP income eligible households by home energy burden.

**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, RECS collects income data less precisely through the use of income intervals. Finally, the CPS ASEC collects income more precisely than RECS does and also has a larger sample size than RECS.

As a result, the RECS categorizes too many households as income eligible for LIHEAP. Based on the 2005 RECS, in calendar year 2005, 38.6 million households were estimated to be LIHEAP income eligible households. Based on the 2005 CPS ASEC, the estimate of LIHEAP income eligible households for calendar year 2005, was 34.8 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.<sup>61</sup>

**Figure A-1. Distribution of LIHEAP income eligible households by home energy burden, 2005**



**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.

<sup>61</sup>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.

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*, both mean individual energy burden and mean group burden statistics are now 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 2005 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 2005 were adjusted for weather differences between 2005 and Fiscal Year 2008. The following equation was applied to each household in the microsimulation data file.

$$\text{FY 2008 Projected BTUs} = (2005 \text{ estimated heat use} * \text{HDD change}) + (2005 \text{ estimated cooling use} * \text{CDD change}) + (2005 \text{ estimated water use} + 2005 \text{ estimated appliance use})$$

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

$$\text{Preliminary Expenditures} = 2005 \text{ Expenditures} * (\text{FY 2008 Projected Usage} / 2005 \text{ Actual Usage})$$

$$\text{Final Expenditures} = \text{Preliminary Expenditures} * \text{Price Change}^{62}$$

The following chart 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 2005 to FY 2008. For example, electricity prices increased by almost 18 percent from 2005 to FY 2008.

**Table A-1. National price factors for FY 2008**

Fuel	Price Factors for FY 2008 Projections
Electricity	1.1782
Natural gas	1.0540
Fuel oil / kerosene	1.4350
Liquefied petroleum gas (LPG)	1.6397

Expenditure data were adjusted using national price factors for FY 2008. 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

<sup>62</sup>Price factors were developed using price data obtained from the Energy Information Administration's Monthly Energy Review, March 2009, for all fuels. Electricity and natural gas consumption data used for calculating price factors are from the Energy Information Administration website (<http://www.eia.doe.gov>). Fuel Oil and LPG consumption data used for calculating price factors are from the Monthly Energy Review, March 2009.

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 2008<sup>1/</sup>**

	All Fuels <sup>2/</sup>	Natural Gas	Electricity	Fuel Oil	Kerosene	LPG
(In MmBTUs) <sup>3/</sup>						
<b>United States</b>						
All households	96.3	112.3	61.2	146.9	53.5	107.5
Non low income households	102.5	117.0	65.9	155.9	60.5*	115.3
Low income households <sup>4/</sup>	84.9	102.4	53.2	132.9	52.2	92.9
LIHEAP recipient households <sup>5/</sup>	103.8	114.2	49.2	150.2	74.3*	105.7
<b>Northeast</b>						
All households	121.7	121.2	47.8	150.6	37.9	123.9
Non low income households	132.7	130.2	53.4	161.9	64.5*	134.2
Low income households	105.0	106.1	41.6	134.1	33.4*	97.0*
LIHEAP recipient households	117.0	109.6	48.3	151.5	76.2*	81.7*
<b>Midwest</b>						
All households	117.9	129.9	59.8	128.9	89.1*	129.1
Non low income households	123.7	134.5	65.8	136.8	NC	130.7
Low income households	108.0	122.1	52.4	119.0	89.1*	123.0
LIHEAP recipient households	121.6	134.1	49.2	148.8*	89.7*	105.8*
<b>South</b>						
All households	80.1	106.5	63.3	122.9	51.8	92.2
Non low income households	86.9	113.3	68.1	120.9	59.1*	98.1
Low income households	67.1	89.8	54.2	127.3*	49.7	84.7
LIHEAP recipient households	83.2	100.6	49.3	117.8*	72.2*	109.9*
<b>West</b>						
All households	79.3	88.6	58.1	155.5	61.0*	101.3
Non low income households	84.9	93.2	60.7	149.5*	NC	110.4
Low income households	66.4	74.8	54.1	187.7*	61.0*	85.9
LIHEAP recipient households	70.4	79.0	49.6	176.2*	NC	114.2*

<sup>1/</sup>Developed from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy, and adjusted for FY 2008 for heating and cooling degree days.

<sup>2/</sup>Weighted average of natural gas, electricity, fuel oil, kerosene, and liquefied petroleum gas consumption. Consumption data are not collected for other fuels.

<sup>3/</sup>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.

<sup>4/</sup>Households with income under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>5/</sup> Includes verified LIHEAP recipient households from the 2005 RECS.

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

NC = No cases in the 2005 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 2008**

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars <sup>1/</sup>	Percent <sup>2/</sup>	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
<b>United States</b>												
All households	\$2,172	3.2%	\$2,074	3.1%	\$1,811	2.7%	\$4,127	6.1%	\$1,583	2.3%	\$3,003	4.4%
Non low income households	\$2,328	2.6%	\$2,228	2.5%	\$1,952	2.2%	\$4,414	5.0%	\$1,634*	1.9%	\$3,141	3.6%
Low income households <sup>3/</sup>	\$1,883	10.8%	\$1,748	10.0%	\$1,572	9.0%	\$3,686	21.2%	\$1,574	9.0%	\$2,743	15.8%
LIHEAP recipient households <sup>4/</sup>	\$2,104	14.4%	\$1,874	12.8%	\$1,284	8.8%	\$4,178	28.6%	\$1,790*	12.3%	\$3,303	22.6%
<b>Northeast</b>												
All households	\$2,899	4.0%	\$2,342	3.2%	\$1,741	2.4%	\$4,298	5.9%	\$1,255	1.7%	\$3,804	5.2%
Non low income households	\$3,173	3.2%	\$2,578	2.6%	\$1,836	1.9%	\$4,670	4.7%	\$2,385*	2.4%	\$3,883	3.9%
Low income households	\$2,484	13.2%	\$1,947	10.3%	\$1,634	8.7%	\$3,755	20.0%	\$1,066*	5.7%	\$3,599*	19.1%
LIHEAP recipient households	\$2,750	17.7%	\$2,038	13.1%	\$1,547	10.0%	\$4,256	27.4%	\$2,097*	13.5%	\$2,480*	16.0%
<b>Midwest</b>												
All households	\$2,102	3.2%	\$2,069	3.2%	\$1,422	2.2%	\$3,418	5.2%	\$2,113*	3.2%	\$3,323	5.1%
Non low income households	\$2,240	2.6%	\$2,182	2.6%	\$1,564	1.8%	\$3,637	4.3%	NC	NC	\$3,325	3.9%
Low income households	\$1,868	10.5%	\$1,876	10.5%	\$1,246	7.0%	\$3,141	17.6%	\$2,113*	11.8%	\$3,314	18.6%
LIHEAP recipient households	\$1,954	13.7%	\$1,991	14.0%	\$1,220	8.6%	\$3,828*	26.9%	\$1,609*	11.3%	\$2,929*	20.6%
<b>South</b>												
All households	\$2,086	3.3%	\$2,236	3.5%	\$1,932	3.1%	\$3,190	5.1%	\$1,613	2.6%	\$2,668	4.2%
Non low income households	\$2,236	2.7%	\$2,422	3.0%	\$2,056	2.5%	\$3,042	3.7%	\$1,388*	1.7%	\$2,760	3.4%
Low income households	\$1,799	11.3%	\$1,776	11.1%	\$1,699	10.7%	\$3,513*	22.0%	\$1,700	10.7%	\$2,551	16.0%
LIHEAP recipient households	\$1,932	15.5%	\$1,834	14.7%	\$1,370	11.0%	\$3,180*	25.6%	\$1,743*	14.0%	\$3,654*	29.4%
<b>West</b>												
All households	\$1,773	2.4%	\$1,720	2.4%	\$1,620	2.2%	\$3,904	5.4%	\$1,510*	2.1%	\$2,952	4.0%
Non low income households	\$1,939	2.1%	\$1,877	2.0%	\$1,781	1.9%	\$3,844*	4.1%	NC	NC	\$3,234	3.5%
Low income households	\$1,390	7.6%	\$1,249	6.8%	\$1,365	7.5%	\$4,227*	23.2%	\$1,510*	8.3%	\$2,476	13.6%
LIHEAP recipient households	\$1,312	8.1%	\$1,208	7.5%	\$1,067	6.6%	\$4,258*	26.3%	NC	NC	\$3,158*	19.5%

<sup>1/</sup>Estimates are derived from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2005 RECS data have been adjusted for heating degree days, cooling degree days, and fuel price estimates for FY 2008. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered and billed costs for natural gas and electricity. Expenditure data are not collected for other fuels.

<sup>2/</sup>Represents the percent of household's income used for residential energy expenditures. National and regional mean incomes are calculated from the 2008 CPS ASEC, which reports income for calendar year 2007. 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.

<sup>3/</sup>Households with annual incomes under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>4/</sup>Includes verified LIHEAP recipient households from the 2005 RECS.

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

NC = No cases in the 2005 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 2008**

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars <sup>1/</sup>	Percent <sup>2/</sup>	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
<b>United States</b>												
All households	\$2,172	7.4%	\$2,074	6.3%	\$1,811	7.1%	\$4,127	14.6%	\$1,583	10.4%	\$3,003	10.1%
Non low income households	\$2,328	3.7%	\$2,228	3.4%	\$1,952	3.3%	\$4,414	6.7%	\$1,634*	4.8%	\$3,141	5.4%
Low income households <sup>3/</sup>	\$1,883	14.1%	\$1,748	12.4%	\$1,572	13.4%	\$3,686	26.7%	\$1,574	11.4%	\$2,743	18.8%
LIHEAP recipient households <sup>4/</sup>	\$2,104	16.8%	\$1,874	14.8%	\$1,284	15.1%	\$4,178	29.4%	\$1,790*	18.9%	\$3,303	18.3%
<b>Northeast</b>												
All households	\$2,899	9.7%	\$2,342	7.1%	\$1,741	7.6%	\$4,298	15.0%	\$1,255	10.4%	\$3,804	10.9%
Non low income households	\$3,173	4.7%	\$2,578	3.9%	\$1,836	3.0%	\$4,670	6.7%	\$2,385*	4.6%	\$3,883	5.7%
Low income households	\$2,484	17.2%	\$1,947	12.5%	\$1,634	12.7%	\$3,755	27.2%	\$1,066*	11.3%	\$3,599*	24.4%
LIHEAP recipient households	\$2,750	19.4%	\$2,038	13.9%	\$1,547	17.0%	\$4,256	29.0%	\$2,097*	27.0%	\$2,480*	12.9%
<b>Midwest</b>												
All households	\$2,102	7.2%	\$2,069	7.3%	\$1,422	5.8%	\$3,418	13.4%	\$2,113*	9.5%	\$3,323	7.7%
Non low income households	\$2,240	3.6%	\$2,182	3.5%	\$1,564	3.0%	\$3,637	6.3%	NC	NC	\$3,325	5.1%
Low income households	\$1,868	13.4%	\$1,876	13.9%	\$1,246	9.3%	\$3,141	22.3%	\$2,113*	9.5%	\$3,314	17.5%
LIHEAP recipient households	\$1,954	18.0%	\$1,991	17.3%	\$1,220	20.3%	\$3,828*	35.7%	\$1,609*	6.6%	\$2,929*	15.5%
<b>South</b>												
All households	\$2,086	7.7%	\$2,236	6.6%	\$1,932	7.6%	\$3,190	13.4%	\$1,613	10.9%	\$2,668	11.7%
Non low income households	\$2,236	3.9%	\$2,422	3.9%	\$2,056	3.6%	\$3,042	6.8%	\$1,388*	4.8%	\$2,760	6.0%
Low income households	\$1,799	15.0%	\$1,776	13.2%	\$1,699	15.2%	\$3,513*	27.9%	\$1,700	12.6%	\$2,551	19.0%
LIHEAP recipient households	\$1,932	16.5%	\$1,834	14.3%	\$1,370	16.0%	\$3,180*	36.4%	\$1,743*	18.6%	\$3,654*	22.2%
<b>West</b>												
All households	\$1,773	5.0%	\$1,720	4.1%	\$1,620	5.8%	\$3,904	9.8%	\$1,510*	8.0%	\$2,952	9.7%
Non low income households	\$1,939	2.8%	\$1,877	2.7%	\$1,781	2.6%	\$3,844*	6.5%	NC	NC	\$3,234	5.0%
Low income households	\$1,390	10.0%	\$1,249	8.4%	\$1,365	10.8%	\$4,227*	27.7%	\$1,510*	8.0%	\$2,476	17.6%
LIHEAP recipient households	\$1,312	9.0%	\$1,208	9.6%	\$1,067	8.1%	\$4,258*	4.5%	NC	NC	\$3,158*	10.4%

<sup>1/</sup>Estimates are derived from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2005 RECS data have been adjusted for heating degree days, cooling degree days, and fuel price estimates for FY 2008. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered and billed costs for natural gas and electricity. Expenditure data are not collected for other fuels.

<sup>2/</sup>Represents the percent of household income used for residential energy expenditures. For individual households, FY 2008 income is estimated by inflating income reported in the 2005 RECS by the consumer price index (CPI) and FY 2008 energy expenditures are estimated by adjusting energy expenditures reported in the 2005 RECS for changes in weather and energy prices. FY 2008 residential energy burden for each household is computed as estimated FY 2008 residential energy expenditures divided by estimated FY 2008 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.

<sup>3/</sup>Households with annual incomes under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>4/</sup> Includes verified LIHEAP recipient households from the 2005 RECS.

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

NC = No cases in 2005 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 2008**

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars <sup>1/</sup>	Percent <sup>2/</sup>	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
<b>United States</b>												
All households	\$2,172	4.4%	\$2,074	4.0%	\$1,811	4.0%	\$4,127	8.6%	\$1,583	7.8%	\$3,003	6.8%
Non low income households	\$2,328	3.2%	\$2,228	3.0%	\$1,952	2.9%	\$4,414	6.0%	\$1,634*	5.0%	\$3,141	5.0%
Low income households <sup>3/</sup>	\$1,883	9.7%	\$1,748	8.9%	\$1,572	8.4%	\$3,686	20.2%	\$1,574	9.2%	\$2,743	14.8%
LIHEAP recipient households <sup>4/</sup>	\$2,104	10.9%	\$1,874	10.6%	\$1,284	9.3%	\$4,178	29.6%	\$1,790*	15.4%	\$3,303	12.0%
<b>Northeast</b>												
All households	\$2,899	5.8%	\$2,342	4.5%	\$1,741	4.5%	\$4,298	8.7%	\$1,255	9.2%	\$3,804	6.9%
Non low income households	\$3,173	4.1%	\$2,578	3.3%	\$1,836	2.7%	\$4,670	5.8%	\$2,385*	4.4%	\$3,883	6.1%
Low income households	\$2,484	11.3%	\$1,947	9.1%	\$1,634	8.2%	\$3,755	20.2%	\$1,066*	9.2%	\$3,599*	23.1%
LIHEAP recipient households	\$2,750	12.3%	\$2,038	7.9%	\$1,547	11.9%	\$4,256	29.6%	\$2,097*	15.8%	\$2,480*	10.6%
<b>Midwest</b>												
All households	\$2,102	4.5%	\$2,069	4.3%	\$1,422	4.0%	\$3,418	8.4%	\$2,113*	6.8%	\$3,323	5.1%
Non low income households	\$2,240	3.1%	\$2,182	3.0%	\$1,564	2.4%	\$3,637	5.3%	NC	NC	\$3,325	4.8%
Low income households	\$1,868	10.2%	\$1,876	10.2%	\$1,246	7.1%	\$3,141	21.0%	\$2,113*	6.8%	\$3,314	17.9%
LIHEAP recipient households	\$1,954	11.5%	\$1,991	11.5%	\$1,220	10.7%	\$3,828*	35.9%	\$1,609*	6.6%	\$2,929*	20.4%
<b>South</b>												
All households	\$2,086	4.6%	\$2,236	4.4%	\$1,932	4.4%	\$3,190	9.2%	\$1,613	7.1%	\$2,668	8.0%
Non low income households	\$2,236	3.3%	\$2,422	3.4%	\$2,056	3.2%	\$3,042	7.4%	\$1,388*	6.0%	\$2,760	5.6%
Low income households	\$1,799	10.0%	\$1,776	9.9%	\$1,699	9.6%	\$3,513*	20.0%	\$1,700	10.2%	\$2,551	14.0%
LIHEAP recipient households	\$1,932	15.4%	\$1,834	15.4%	\$1,370	9.6%	\$3,180*	43.2%	\$1,743*	15.4%	\$3,654*	14.9%
<b>West</b>												
All households	\$1,773	3.1%	\$1,720	2.8%	\$1,620	3.2%	\$3,904	6.2%	\$1,510*	8.6%	\$2,952	6.1%
Non low income households	\$1,939	2.4%	\$1,877	2.3%	\$1,781	2.3%	\$3,844*	6.2%	NC	NC	\$3,234	4.4%
Low income households	\$1,390	6.2%	\$1,249	6.1%	\$1,365	6.0%	\$4,227*	31.4%	\$1,510*	8.6%	\$2,476	10.8%
LIHEAP recipient households	\$1,312	8.4%	\$1,208	8.4%	\$1,067	8.0%	\$4,258*	4.5%	NC	NC	\$3,158*	5.4%

<sup>1/</sup>Estimates are derived from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2005 RECS data have been adjusted for heating degree days, cooling degree days, and fuel price estimates for FY 2008. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered and billed costs for natural gas and electricity. Expenditure data are not collected for other fuels.

<sup>2/</sup>Represents the percent of household income used for residential energy expenditures. For individual households, FY 2008 income is estimated by inflating income reported in the 2005 RECS by the consumer price index (CPI) and FY 2008 energy expenditures are estimated by adjusting energy expenditures reported in the 2005 RECS for changes in weather and energy prices. FY 2008 residential energy burden for each household is computed as estimated FY 2008 residential energy expenditures divided by estimated FY 2008 annual income. Median individual residential burden is computed by computing the median of the individual values.

<sup>3/</sup>Households with annual incomes under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>4/</sup>Includes verified LIHEAP recipient households from the 2005 RECS.

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

NC = No cases in the 2005 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, April 2005<sup>1/</sup>**

	Natural Gas <sup>2/</sup>	Electricity	Fuel Oil	Kerosene	LPG	Other <sup>3/</sup>
<b>United States</b>						
All households	52.6%	30.1%	6.9%	0.6%	5.5%	3.2%
Non low income households	55.0%	29.2%	6.5%	0.1%	5.5%	2.9%
Low income households <sup>4/</sup>	48.1%	31.8%	7.8%	1.5%	5.4%	3.7%
LIHEAP recipient households <sup>5/</sup>	60.0%	19.0%	12.0%	2.4%	5.2%	1.2%
<b>Northeast</b>						
All households	55.5%	7.9%	30.1%	0.9%	2.1%	3.1%
Non low income households	57.7%	6.9%	29.7%	0.2%	2.6%	2.9%
Low income households	52.3%	9.3%	30.8%	1.9%	1.5%	3.2%
LIHEAP recipient households	53.8%	8.4%	33.6%	1.3%	2.4%	0.5%
<b>Midwest</b>						
All households	72.6%	13.2%	2.7%	0.3%	7.4%	3.5%
Non low income households	73.0%	11.6%	2.4%	NC	9.3%	3.5%
Low income households	72.0%	15.8%	3.2%	0.9%	4.2%	3.6%
LIHEAP recipient households	80.2%	13.4%	2.5%	0.7%	2.8%	0.5%
<b>South</b>						
All households	33.7%	53.9%	1.3%	0.9%	6.6%	2.6%
Non low income households	36.6%	53.7%	1.4%	0.3%	5.6%	1.8%
Low income households	28.2%	54.5%	1.2%	2.0%	8.5%	4.0%
LIHEAP recipient households	44.9%	31.1%	2.4%	7.7%	12.4%	1.5%
<b>West</b>						
All households	60.7%	26.7%	1.1%	0.2%	4.3%	3.9%
Non low income households	65.3%	23.4%	1.3%	NC	3.9%	3.8%
Low income households	50.2%	34.2%	0.6%	0.7%	5.3%	4.1%
LIHEAP recipient households	54.6%	34.0%	1.4%	NC	4.6%	3.6%

<sup>1/</sup>Data derived from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. Represents main heating fuel used in April 2005.

<sup>2/</sup>The sum of percentages across fuel types may not equal 100%, due to rounding.

<sup>3/</sup>This category includes households using wood, coal, and other minor fuels as a main heating source and households reporting no main fuel.

<sup>4/</sup>Households with income under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>5/</sup> Includes verified LIHEAP recipient households from the 2005 RECS.

NC = No cases in the 2005 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 2008<sup>1/</sup>**

	All Fuels <sup>2/</sup>	Natural Gas	Electricity	Fuel Oil	Kerosene	LPG
(In MmBTUs) <sup>3/</sup>						
United States						
All households	39.6	51.6	8.4	96.4	20.0	51.4
Non low income households	40.7	51.1	8.8	100.1	24.9*	57.4
Low income households <sup>4/</sup>	37.5	52.7	7.7	90.8	19.1	39.9
LIHEAP recipient households <sup>5/</sup>	53.7	62.7	8.6	97.0	22.1*	43.3
Northeast						
All households	70.0	67.0	12.4	97.9	15.7	74.9
Non low income households	74.6	69.5	13.4	103.3	23.3*	81.8
Low income households	63.2	62.8	11.3	90.0	14.4*	57.2*
LIHEAP recipient households	68.6	63.6	11.4	95.4	15.9*	46.7*
Midwest						
All households	61.5	71.0	14.8	85.3	46.8*	69.5
Non low income households	63.1	71.5	16.6	77.6	NC	72.3
Low income households	58.9	70.2	12.5	95.0	46.8*	59.3
LIHEAP recipient households	68.4	77.5	11.6	124.5*	5.2*	57.8*
South						
All households	19.2	33.9	7.1	88.2	15.8	37.3
Non low income households	20.3	34.7	7.6	91.3	25.5*	37.7
Low income households	16.9	32.1	6.1	81.6*	13.0	36.7
LIHEAP recipient households	29.9	44.0	6.0	67.4*	25.4*	38.1*
West						
All households	24.9	31.7	8.4	108.1	20.0*	44.9
Non low income households	26.8	32.1	8.4	100.8*	NC	57.1
Low income households	20.5	30.4	8.2	147.3*	20.0*	24.2
LIHEAP recipient households	29.0	39.2	8.7	157.6*	NC	44.0*

<sup>1/</sup>Developed from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy, and adjusted for FY 2008 for heating degree days.

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

<sup>3/</sup>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.

<sup>4/</sup>Households with income under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>5/</sup> Includes verified LIHEAP recipient households from the 2005 RECS.

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

NC = No cases in the 2005 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 2008**

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars <sup>1/</sup>	Percent <sup>2/</sup>	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States												
All households	\$640	0.9%	\$601	0.9%	\$257	0.4%	\$2,342	3.5%	\$465	0.7%	\$1,341	2.0%
Non low income households	\$656	0.7%	\$600	0.7%	\$270	0.3%	\$2,438	2.8%	\$569*	0.6%	\$1,451	1.7%
Low income households <sup>3/</sup>	\$611	3.5%	\$602	3.5%	\$235	1.3%	\$2,195	12.6%	\$446	2.6%	\$1,134	6.5%
LIHEAP recipient households <sup>4/</sup>	\$839	5.7%	\$720	4.9%	\$249	1.7%	\$2,347	16.1%	\$489*	3.3%	\$1,231	8.4%
Northeast												
All households	\$1,281	1.8%	\$846	1.2%	\$485	0.7%	\$2,372	3.3%	\$366	0.5%	\$1,888	2.6%
Non low income households	\$1,362	1.4%	\$892	0.9%	\$466	0.5%	\$2,511	2.5%	\$551*	0.6%	\$1,960	2.0%
Low income households	\$1,159	6.2%	\$768	4.1%	\$507	2.7%	\$2,170	11.5%	\$335*	1.8%	\$1,701*	9.0%
LIHEAP recipient households	\$1,260	8.1%	\$766	4.9%	\$418	2.7%	\$2,305	14.8%	\$319*	2.1%	\$1,360*	8.7%
Midwest												
All households	\$814	1.2%	\$786	1.2%	\$373	0.6%	\$2,079	3.2%	\$1,099*	1.7%	\$1,670	2.5%
Non low income households	\$843	1.0%	\$794	0.9%	\$417	0.5%	\$1,899	2.2%	NC	NC	\$1,700	2.0%
Low income households	\$765	4.3%	\$771	4.3%	\$317	1.8%	\$2,308	12.9%	\$1,099*	6.2%	\$1,556	8.7%
LIHEAP recipient households	\$842	5.9%	\$855	6.0%	\$302	2.1%	\$3,076*	21.6%	\$89*	0.6%	\$1,428*	10.0%
South												
All households	\$370	0.6%	\$420	0.7%	\$225	0.4%	\$2,188	3.5%	\$365	0.6%	\$1,066	1.7%
Non low income households	\$383	0.5%	\$432	0.5%	\$239	0.3%	\$2,251	2.8%	\$575*	0.7%	\$1,059	1.3%
Low income households	\$346	2.2%	\$391	2.5%	\$197	1.2%	\$2,051*	12.9%	\$307	1.9%	\$1,074	6.7%
LIHEAP recipient households	\$536	4.3%	\$569	4.6%	\$167	1.3%	\$1,620*	13.0%	\$571*	4.6%	\$1,180*	9.5%
West												
All households	\$364	0.5%	\$345	0.5%	\$248	0.3%	\$2,648	3.6%	\$455*	0.6%	\$1,224	1.7%
Non low income households	\$391	0.4%	\$352	0.4%	\$267	0.3%	\$2,488*	2.7%	NC	NC	\$1,531	1.6%
Low income households	\$300	1.6%	\$322	1.8%	\$218	1.2%	\$3,507*	19.2%	\$455*	2.5%	\$704	3.9%
LIHEAP recipient households	\$419	2.6%	\$401	2.5%	\$235	1.4%	\$3,792*	23.4%	NC	NC	\$1,058*	6.5%

<sup>1/</sup>Expenditures shown in this table are derived from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2005 RECS data have been adjusted for heating degree days and fuel price estimates for FY 2008. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered, and billed costs for natural gas and electricity used. Expenditure data are not collected for other fuels.

<sup>2/</sup>Represents the percent of household income used for home heating energy expenditures. National and regional mean incomes are calculated from the 2008 CPS ASEC, which reports income for calendar year 2007. 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.

<sup>3/</sup>Households with annual incomes under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>4/</sup>Includes verified LIHEAP recipient households from the 2005 RECS.

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

NC = No cases in the 2005 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 2008**

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars <sup>1/</sup>	Percent <sup>2/</sup>	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States												
All households	\$640	2.4%	\$601	2.2%	\$257	1.1%	\$2,342	9.3%	\$465	2.7%	\$1,341	4.5%
Non low income households	\$656	1.1%	\$600	1.0%	\$270	0.5%	\$2,438	3.9%	\$569*	1.9%	\$1,451	2.5%
Low income households <sup>3/</sup>	\$611	4.8%	\$602	4.6%	\$235	2.1%	\$2,195	17.7%	\$446	2.9%	\$1,134	8.3%
LIHEAP recipient households <sup>4/</sup>	\$839	7.1%	\$720	6.6%	\$249	3.5%	\$2,347	16.5%	\$489*	4.2%	\$1,231	7.8%
Northeast												
All households	\$1,281	4.8%	\$846	2.9%	\$485	2.7%	\$2,372	9.5%	\$366	2.7%	\$1,888	5.7%
Non low income households	\$1,362	2.1%	\$892	1.4%	\$466	0.8%	\$2,511	3.8%	\$551*	1.0%	\$1,960	3.0%
Low income households	\$1,159	9.0%	\$768	5.3%	\$507	4.8%	\$2,170	17.8%	\$335*	3.0%	\$1,701*	12.6%
LIHEAP recipient households	\$1,260	9.1%	\$766	5.8%	\$418	5.4%	\$2,305	15.7%	\$319*	3.8%	\$1,360*	7.5%
Midwest												
All households	\$814	3.1%	\$786	3.2%	\$373	1.5%	\$2,079	9.2%	\$1,099*	4.8%	\$1,670	3.9%
Non low income households	\$843	1.4%	\$794	1.3%	\$417	0.8%	\$1,899	3.6%	NC	NC	\$1,700	2.6%
Low income households	\$765	6.1%	\$771	6.5%	\$317	2.5%	\$2,308	16.4%	\$1,099*	4.8%	\$1,556	8.8%
LIHEAP recipient households	\$842	8.9%	\$855	9.0%	\$302	5.6%	\$3,076*	28.9%	\$89*	0.4%	\$1,428*	8.3%
South												
All households	\$370	1.5%	\$420	1.4%	\$225	0.9%	\$2,188	8.7%	\$365	2.3%	\$1,066	5.1%
Non low income households	\$383	0.7%	\$432	0.7%	\$239	0.4%	\$2,251	5.1%	\$575*	2.2%	\$1,059	2.4%
Low income households	\$346	2.9%	\$391	3.1%	\$197	1.8%	\$2,051*	16.4%	\$307	2.3%	\$1,074	8.5%
LIHEAP recipient households	\$536	4.8%	\$569	4.7%	\$167	2.6%	\$1,620*	18.2%	\$571*	4.8%	\$1,180*	8.6%
West												
All households	\$364	1.1%	\$345	0.9%	\$248	1.0%	\$2,648	7.3%	\$455*	2.4%	\$1,224	3.7%
Non low income households	\$391	0.6%	\$352	0.5%	\$267	0.4%	\$2,488*	4.4%	NC	NC	\$1,531	2.3%
Low income households	\$300	2.2%	\$322	2.1%	\$218	1.9%	\$3,507*	22.7%	\$455*	2.4%	\$704	6.0%
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<sup>1/</sup>Expenditures shown in this table are derived from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2005 RECS data have been adjusted for heating degree days and fuel price estimates for FY 2008. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered, and billed costs for natural gas and electricity used. Expenditure data are not collected for other fuels.

<sup>2/</sup>Represents the percent of household income used for home heating energy expenditures. For individual households, FY 2008 income is estimated by inflating income reported in the 2005 RECS by the consumer price index (CPI) and FY 2008 energy expenditures are estimated by adjusting energy expenditures reported in the 2005 RECS for changes in weather and energy prices. FY 2008 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.

<sup>3/</sup>Households with annual incomes under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>4/</sup>Includes verified LIHEAP recipient households from the 2005 RECS.

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

NC = No cases in the 2005 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 2008**

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars <sup>1/</sup>	Percent <sup>2/</sup>	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
<b>United States</b>												
All households	\$640	0.9%	\$601	1.1%	\$257	0.5%	\$2,342	5.1%	\$465	2.2%	\$1,341	2.9%
Non low income households	\$656	0.6%	\$600	0.7%	\$270	0.3%	\$2,438	3.2%	\$569*	1.2%	\$1,451	2.1%
Low income households <sup>3/</sup>	\$611	2.2%	\$602	2.9%	\$235	1.2%	\$2,195	12.1%	\$446	2.2%	\$1,134	5.8%
LIHEAP recipient households <sup>4/</sup>	\$839	3.6%	\$720	3.6%	\$249	1.6%	\$2,347	13.5%	\$489*	5.7%	\$1,231	5.2%
<b>Northeast</b>												
All households	\$1,281	2.3%	\$846	1.6%	\$485	1.2%	\$2,372	4.7%	\$366	1.9%	\$1,888	3.8%
Non low income households	\$1,362	1.5%	\$892	1.1%	\$466	0.8%	\$2,511	3.2%	\$551*	1.2%	\$1,960	2.9%
Low income households	\$1,159	4.9%	\$768	3.5%	\$507	2.5%	\$2,170	11.2%	\$335*	1.9%	\$1,701*	9.8%
LIHEAP recipient households	\$1,260	5.2%	\$766	2.9%	\$418	3.3%	\$2,305	13.5%	\$319*	2.7%	\$1,360*	6.2%
<b>Midwest</b>												
All households	\$814	1.6%	\$786	1.6%	\$373	1.0%	\$2,079	5.1%	\$1,099*	2.4%	\$1,670	2.8%
Non low income households	\$843	1.1%	\$794	1.1%	\$417	0.7%	\$1,899	3.3%	NC	NC	\$1,700	2.3%
Low income households	\$765	3.6%	\$771	3.9%	\$317	1.8%	\$2,308	16.0%	\$1,099*	2.4%	\$1,556	9.8%
LIHEAP recipient households	\$842	4.5%	\$855	4.7%	\$302	2.3%	\$3,076*	27.2%	\$89*	0.4%	\$1,428*	12.0%
<b>South</b>												
All households	\$370	0.6%	\$420	0.7%	\$225	0.5%	\$2,188	6.7%	\$365	1.8%	\$1,066	3.1%
Non low income households	\$383	0.4%	\$432	0.5%	\$239	0.3%	\$2,251	5.5%	\$575*	3.1%	\$1,059	1.8%
Low income households	\$346	1.4%	\$391	2.0%	\$197	1.0%	\$2,051*	12.0%	\$307	1.8%	\$1,074	5.8%
LIHEAP recipient households	\$536	2.1%	\$569	3.5%	\$167	1.5%	\$1,620*	16.2%	\$571*	5.7%	\$1,180*	2.0%
<b>West</b>												
All households	\$364	0.5%	\$345	0.5%	\$248	0.4%	\$2,648	3.9%	\$455*	2.4%	\$1,224	2.2%
Non low income households	\$391	0.4%	\$352	0.4%	\$267	0.3%	\$2,488*	3.9%	NC	NC	\$1,531	2.1%
Low income households	\$300	1.1%	\$322	1.3%	\$218	0.9%	\$3,507*	25.7%	\$455*	2.4%	\$704	3.6%
LIHEAP recipient households	\$419	1.8%	\$401	2.6%	\$235	1.3%	\$3,792*	4.0%	NC	NC	\$1,058*	1.0%

<sup>1/</sup> Expenditures shown in this table are derived from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2005 RECS data have been adjusted for heating degree days and fuel price estimates for FY 2008. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered, and billed costs for natural gas and electricity used. Expenditure data are not collected for other fuels.

<sup>2/</sup> Represents the percent of household income used for home heating energy expenditures. For individual households, FY 2008 income is estimated by inflating income reported in the 2005 RECS by the consumer price index (CPI) and FY 2008 energy expenditures are estimated by adjusting energy expenditures reported in the 2005 RECS for changes in weather and energy prices. FY 2008 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.

<sup>3/</sup> Households with annual incomes under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>4/</sup> Includes verified LIHEAP recipient households from the 2005 RECS.

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

NC = No cases in the 2005 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 2008**

	Percent that cool <sup>1/</sup>	Consumption <sup>2/</sup> (in mmBTUs)	Expenditures <sup>2/</sup>	Mean group burden <sup>3/</sup>	Mean individual burden <sup>3/</sup>	Median individual burden <sup>3/</sup>
<b>United States</b>						
All households	92.1%	8.6	\$289	0.4%	1.1%	0.4%
Non low income households	93.8%	9.4	\$318	0.4%	0.5%	0.3%
Low income households <sup>4/</sup>	89.1%	6.9	\$234	1.3%	2.2%	0.8%
LIHEAP recipient households <sup>5/</sup>	85.5%	4.8	\$165	1.1%	1.3%	0.5%
<b>Northeast</b>						
All households	88.6%	3.3	\$152	0.2%	0.5%	0.2%
Non low income households	93.6%	3.7	\$166	0.2%	0.2%	0.2%
Low income households	81.2%	2.7	\$126	0.7%	1.1%	0.5%
LIHEAP recipient households	84.1%	2.9	\$135	0.9%	0.9%	0.5%
<b>Midwest</b>						
All households	96.7%	4.6	\$135	0.2%	0.4%	0.3%
Non low income households	97.3%	5.0	\$146	0.2%	0.2%	0.2%
Low income households	95.7%	4.0	\$116	0.7%	0.8%	0.5%
LIHEAP recipient households	88.8%	3.3	\$98	0.7%	1.0%	0.5%
<b>South</b>						
All households	98.1%	14.8	\$484	0.8%	2.0%	0.9%
Non low income households	99.4%	16.2	\$526	0.6%	0.9%	0.7%
Low income households	95.5%	12.0	\$401	2.5%	4.1%	2.0%
LIHEAP recipient households	92.1%	10.2	\$330	2.7%	2.5%	1.3%
<b>West</b>						
All households	80.3%	5.8	\$215	0.3%	0.6%	0.2%
Non low income households	81.7%	6.4	\$239	0.3%	0.4%	0.2%
Low income households	77.1%	4.5	\$156	0.9%	1.1%	0.4%
LIHEAP recipient households	70.5%	2.4	\$71	0.4%	0.4%	0.2%

<sup>1/</sup>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 defined by the 2005 RECS (e.g., table and window fans.)

<sup>2/</sup>Consumption and expenditures are derived from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2005 RECS data have been adjusted for cooling degree days and electricity price estimates for FY 2008. Expenditures represent billed costs for electricity used.

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

<sup>4/</sup>Households with annual incomes under the maximum in section 2605(b)(2)(B) of Public Law 97-35.

<sup>5/</sup>Includes verified LIHEAP recipient households from the 2005 RECS.

## **Appendix B: Income Eligible Household Estimates**

ACF encourages LIHEAP grantees to use performance measurement systems to manage LIHEAP programs. With extensive input from LIHEAP grantees, local administering agencies, and other interested parties, ACF developed model LIHEAP performance goals and measures in 1995. ACF has further developed targeting performance indicators to support measurement of LIHEAP targeting at the grantee level. For the last eight 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 target performance measurement statistics.

State-level estimates of the number of income eligible households for FY 2008 were developed using both the CPS ASEC and the ACS. While the CPS ASEC file can be used to make State-level estimates, the statistical variances for many States are too large for the data to be useful for analysis. The U.S. Bureau of the Census uses averages derived from three consecutive years of CPS ASEC data to develop State-level estimates of poverty for the school lunch program. This method reduces the variances of the estimates and improves confidence in the data. To estimate the FY 2008 numbers of LIHEAP income eligible households in the population and in various vulnerability and poverty groups, averages derived from the 2006, 2007, and 2008 CPS ASEC were used. Averages derived from the 2005, 2006, and 2007 ACS were used as well, for similar statistical reasons.

The ACS and CPS ASEC differ in their measurement of income and disability, and despite the fact that both use the same Census definition of a household, the ACS data yield a lower estimate of the total number of households in the United States than do the CPS ASEC data.<sup>63</sup> Estimates from both ACS and CPS ASEC data are presented to show the differences between the two data sources so that readers can assess which changes have resulted from a change in methodology and which changes are actual increases or decreases in the numbers of income eligible households.

Two sets of tables follow. Tables B-1 through B-4 show estimates produced using the averages derived from the 2006, 2007, and 2008 CPS ASEC. Tables B-5 through B-8 show estimates produced using the averages derived from the 2005, 2006, and 2007 ACS.

Odd-numbered tables show the number of LIHEAP income eligible households, calculated using the Federal Maximum Income Standard, by vulnerability or poverty group for each State. Even-numbered tables show the number of LIHEAP income eligible households, calculated using the State Income Standards, by vulnerability or poverty group for each State.

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<sup>63</sup> Though the ACS and CPS ASEC use a common definition of a household, the two differ in terms of who is considered to be a member of the household. For an explanation, and to better understand the differences between the two surveys, please visit “Guidance on Income and Poverty Estimates from Different Sources” at <http://www.census.gov/hhes/www/income/newguidance.html>. With the three-year average of the ACS, there are an estimated 111,688,170 households, while with the three-year average of the CPS ASEC, there are an estimated 115,726,411 households.

It should also be noted that the definition of a household in the ACS and CPS ASEC data differs subtly from that defined in Section 2603(5) of the LIHEAP statute: “The term ‘household’ means any individual or group of individuals who are living together as one economic unit or for whom residential energy is customarily purchased in common or who make undesignated payments for energy in the form of rent.” The ACS and CPS ASEC use the Census definition of a household, which is, “A household includes all the persons who occupy a housing unit. A housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall.”

**LIHEAP Home Energy Notebook for FY 2008: Appendix B: Income Eligible Household Estimates**

**Table B-1. Average of 2006, 2007, and 2008 State-level estimates of the number of LIHEAP income eligible households using the Federal maximum LIHEAP income standard by vulnerability category<sup>1/ 2/</sup>**

(Three-Year Average of the CPS ASEC 2006-2008)

State	Total number of LIHEAP eligible households <sup>2/</sup>	LIHEAP eligible households by vulnerability category <sup>4/</sup>			LIHEAP eligible households with no vulnerable members
		At least one person 60+ years	At least one child less than 6 yrs. old	At least one person with a disability <sup>5/</sup>	
Alabama	550,398	218,676	96,644	222,511	143,552
Alaska	69,686	15,992	16,659	18,906	25,666
Arizona	630,341	199,741	169,791	155,997	195,265
Arkansas	301,160	125,570	53,300	107,443	81,393
California	3,840,876	1,433,466	867,982	900,832	1,199,091
Colorado	514,153	161,905	111,999	93,421	189,341
Connecticut	457,617	199,635	72,000	107,500	136,185
Delaware	95,394	39,358	20,648	23,561	23,949
District of Columbia	69,861	25,633	9,455	23,024	22,837
Florida	2,013,483	957,840	303,252	463,496	562,674
Georgia	999,434	327,173	249,240	302,206	295,120
Hawaii	109,532	48,210	19,674	24,980	31,269
Idaho	123,765	47,450	32,428	31,898	27,720
Illinois	1,506,838	613,244	284,964	316,661	454,387
Indiana	729,137	270,804	144,019	188,696	209,882
Iowa	324,110	130,322	60,389	71,272	92,805
Kansas	313,277	115,880	66,491	69,736	97,187
Kentucky	508,792	196,556	88,785	209,475	117,850
Louisiana	476,654	184,030	96,382	153,596	123,640
Maine	154,662	71,003	19,210	52,029	35,879
Maryland	607,980	256,067	106,887	135,817	190,970
Massachusetts	872,740	395,627	118,230	247,032	237,343
Michigan	1,218,551	479,263	219,668	350,573	350,804
Minnesota	587,936	245,140	93,812	121,059	183,310
Mississippi	339,311	137,799	71,637	139,376	80,596
Missouri	683,461	286,129	132,454	223,354	161,388
Montana	96,489	35,230	16,431	27,655	26,373
Nebraska	191,140	72,116	33,847	40,134	63,160
Nevada	224,501	87,816	47,662	51,596	66,181
New Hampshire	134,222	65,602	17,033	30,396	36,733
New Jersey	1,037,955	493,587	159,256	219,997	289,623
New Mexico	208,290	72,618	36,985	55,287	72,158
New York	2,478,716	1,040,835	399,422	657,721	728,136
North Carolina	1,061,471	442,533	194,854	334,707	287,670
North Dakota	75,800	30,677	12,680	12,115	26,390
Ohio	1,363,060	516,151	279,063	371,095	386,233
Oklahoma	404,643	148,694	88,461	118,330	121,501
Oregon	401,851	173,212	72,931	97,909	108,539
Pennsylvania	1,489,149	720,161	234,379	374,805	360,147
Rhode Island	129,094	53,505	20,376	38,905	33,275
South Carolina	480,334	202,161	82,900	163,337	121,011
South Dakota	83,527	36,233	15,654	17,028	24,325
Tennessee	715,897	301,523	118,391	252,128	173,817
Texas	2,456,387	876,525	638,276	673,275	692,509
Utah	198,661	62,368	61,134	39,152	56,312
Vermont	75,913	33,381	9,247	19,558	21,638
Virginia	816,492	345,656	174,391	210,301	221,897
Washington	674,016	272,743	122,457	180,655	191,108
West Virginia	204,218	88,366	34,461	85,241	41,450
Wisconsin	661,315	292,628	94,333	156,614	190,740
Wyoming	56,989	24,040	10,967	12,843	16,165
All States	33,819,278	13,670,869	6,501,592	8,995,236	9,627,194

<sup>1/</sup> State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

<sup>2/</sup> The greater of 60 percent of State median income estimates or 150 percent of the HHS Poverty Guidelines.

<sup>3/</sup> The three year CPS ASEC average estimate of the total number of all U.S. households is 115,726,411.

<sup>4/</sup> A household can be counted under more than one vulnerability category.

<sup>5/</sup> A person with a disability is defined as anyone 15 years or older who had limited work opportunities during the past year due to a disability, as reported on the CPS ASEC. The definition also includes individuals who received Veteran's Disability income or Social Security Disability income for themselves or for a surviving, dependent, or disabled child, as well as individuals under age 65 who received Supplemental Security Income or Medicare benefits in the past year.

**LIHEAP Home Energy Notebook for FY 2008: Appendix B: Income Eligible Household Estimates**

**Table B-2. Average of 2006, 2007, and 2008 State-level estimates of the number of LIHEAP income eligible households using State LIHEAP income standards by vulnerability category<sup>1/ 2/</sup>**

(Three-Year Average of CPS ASEC 2006-2008)

State	State Income Guidelines for 4-Person Household as % of HHS Poverty Guidelines	Total number of LIHEAP eligible households <sup>2/</sup>	LIHEAP eligible households by vulnerability category <sup>4/</sup>			LIHEAP eligible households with no vulnerable members
			At least one person 60+	At least one child less than 6 yrs. old	At least one person with a disability <sup>5/</sup>	
Alabama	150	447,785	173,003	82,033	187,964	112,228
Alaska	150	52,832	11,072	13,232	15,754	18,942
Arizona	150	484,240	140,000	138,993	123,689	151,226
Arkansas	125	215,776	84,580	43,566	81,476	55,121
California	<sup>6/</sup> 205	3,838,847	1,432,992	866,428	900,832	1,199,091
Colorado	185	411,897	126,828	93,516	82,197	146,897
Connecticut	<sup>7/</sup> 150	269,722	131,254	40,368	83,555	56,966
Delaware	200	78,174	31,406	17,969	20,428	18,305
District of Columbia	<sup>6/</sup> 146	69,561	25,633	9,155	23,024	22,837
Florida	150	1,481,139	684,472	239,954	358,409	406,850
Georgia	150	723,614	226,905	201,263	238,521	190,904
Hawaii	150	78,555	33,196	14,268	19,453	22,137
Idaho	150	106,481	39,776	29,808	27,621	22,803
Illinois	150	863,177	326,436	185,514	216,816	240,407
Indiana	150	493,534	175,284	107,443	147,288	131,524
Iowa	150	209,055	74,783	43,587	53,537	59,882
Kansas	130	166,305	54,600	41,462	51,733	43,246
Kentucky	130	355,374	127,403	73,352	156,368	74,084
Louisiana	<sup>6/</sup> 163	475,551	184,030	95,280	153,596	123,640
Maine	<sup>8/</sup> 150	117,492	56,394	15,281	42,461	22,667
Maryland	175	359,590	150,194	75,207	98,532	91,122
Massachusetts	<sup>9/</sup> 200	664,852	291,430	88,936	203,445	175,086
Michigan	110	502,844	156,841	105,689	200,884	131,628
Minnesota	<sup>6/</sup> 187	456,663	191,548	69,870	101,836	136,637
Mississippi	150	330,764	135,369	71,637	139,376	74,478
Missouri	125	352,673	121,927	85,496	128,193	83,133
Montana	150	86,124	30,424	14,364	24,228	24,537
Nebraska	116	79,129	24,461	14,013	20,506	27,134
Nevada	150	154,526	57,323	35,051	38,759	43,546
New Hampshire	185	85,689	43,929	10,878	22,982	18,364
New Jersey	175	583,060	281,044	95,677	142,052	142,613
New Mexico	150	199,723	70,730	36,385	54,888	66,080
New York	<sup>6/ 10/</sup> 210	2,478,716	1,040,835	399,422	657,721	728,136
North Carolina	110	533,117	195,550	111,798	189,809	137,501
North Dakota	<sup>6/</sup> 174	75,800	30,677	12,680	12,115	26,390
Ohio	175	1,118,437	412,391	247,328	318,712	299,759
Oklahoma	110	224,362	76,588	54,589	72,559	65,430
Oregon	<sup>6/</sup> 180	401,851	173,212	72,931	97,909	108,539
Pennsylvania	150	940,146	418,693	156,181	283,316	213,613
Rhode Island	<sup>6/</sup> 227	129,094	53,505	20,376	38,905	33,275
South Carolina	150	388,791	156,444	74,894	136,888	93,204
South Dakota	160	67,517	29,090	13,342	14,687	19,048
Tennessee	125	462,832	175,994	78,906	180,070	111,002
Texas	125	1,655,748	551,491	456,173	504,881	446,051
Utah	125	99,886	31,201	31,276	22,811	26,547
Vermont	125	33,365	13,773	3,437	10,949	8,501
Virginia	130	340,292	143,264	79,086	103,181	82,288
Washington	125	309,473	107,776	59,192	101,667	80,596
West Virginia	130	156,015	63,041	27,408	68,237	32,330
Wisconsin	150	406,435	169,862	65,029	103,364	113,960
Wyoming	<sup>6/</sup> 183	56,933	24,040	10,910	12,843	16,165
All States	Not applicable	24,673,553	9,562,694	5,030,635	7,091,024	6,776,449

<sup>1/</sup>State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

<sup>2/</sup>State income guidelines can vary from 110 percent of the HHS Poverty Guidelines up to the Federal maximum LIHEAP income standard. The State maximum LIHEAP income standards for a family of four were obtained from ACF's LIHEAP grantee survey.

<sup>3/</sup>The three year CPS ASEC average estimate of the total number of all U.S. households is 115,726,411.

<sup>4/</sup>A household can be counted under more than one vulnerability category.

<sup>5/</sup>A person with a disability is defined as anyone 15 years or older who had limited work opportunities during the past year due to a disability, as reported on the CPS ASEC. The definition also includes individuals who received Veteran's Disability income or Social Security Disability income for themselves or for a surviving, dependent, or disabled child, as well as individuals under age 65 who received Supplemental Security Income or Medicare benefits in the past year.

<sup>6/</sup>These States use a percent of State median income. The figures reported are the conversion to a percent of the HHS Poverty Guidelines.

<sup>7/</sup>200 percent of the HHS Poverty Guidelines if a household member is elderly or disabled.

<sup>8/</sup>170 percent of the HHS Poverty Guidelines if a household member is susceptible to hypothermia (elderly over 60 or children under 2).

<sup>9/</sup>150 percent of the HHS Poverty Guidelines whenever 200 percent of the HHS Poverty Guidelines exceeds 60 percent of the State median income.

<sup>10/</sup>150 percent of the HHS Poverty Guidelines for a family size of 11 or more.

**LIHEAP Home Energy Notebook for FY 2008: Appendix B: Income Eligible Household Estimates**

**Table B-3. Average of 2006, 2007, and 2008 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<sup>1/ 2/</sup>**

(Three-Year Average of CPS ASEC 2006-2008)

State	Total number of LIHEAP eligible households <sup>3/</sup>	Number of LIHEAP eligible households by intervals of HHS Poverty Guidelines			
		At or below poverty guidelines	>100% - 125% poverty guidelines	>125% - 150% poverty guidelines	Over 150% poverty guidelines
Alabama	550,398	268,655	90,285	88,845	102,613
Alaska	69,686	28,735	11,785	12,312	16,854
Arizona	630,341	276,456	107,222	100,562	146,101
Arkansas	301,160	152,005	63,771	71,469	13,916
California	3,840,876	1,250,875	683,775	606,271	1,299,956
Colorado	514,153	174,858	72,016	73,174	194,105
Connecticut	457,617	112,788	49,257	53,170	242,402
Delaware	95,394	25,826	10,955	13,127	45,486
District of Columbia	69,861	40,304	10,410	8,712	10,435
Florida	2,013,483	801,536	322,202	357,400	532,345
Georgia	999,434	421,874	147,171	154,568	275,820
Hawaii	109,532	44,781	18,589	15,185	30,977
Idaho	123,765	48,832	27,618	30,030	17,284
Illinois	1,506,838	478,932	185,933	198,312	643,661
Indiana	729,137	274,514	94,248	124,771	235,603
Iowa	324,110	108,296	44,717	56,041	115,056
Kansas	313,277	113,219	41,872	50,365	107,822
Kentucky	508,792	242,598	96,132	97,183	72,879
Louisiana	476,654	246,416	91,088	90,345	48,804
Maine	154,662	56,366	21,945	28,121	48,230
Maryland	607,980	167,952	59,356	71,641	309,032
Massachusetts	872,740	284,158	103,708	92,455	392,420
Michigan	1,218,551	439,448	169,263	151,054	458,785
Minnesota	587,936	144,422	75,157	73,019	295,338
Mississippi	339,311	203,166	66,008	61,590	8,547
Missouri	683,461	242,575	110,098	120,449	210,340
Montana	96,489	47,064	23,967	15,093	10,365
Nebraska	191,140	60,197	33,254	32,164	65,525
Nevada	224,501	80,640	31,926	41,960	69,975
New Hampshire	134,222	28,881	17,649	16,139	71,552
New Jersey	1,037,955	258,259	109,985	111,478	558,233
New Mexico	208,290	111,815	42,373	45,535	8,567
New York	2,478,716	1,006,275	341,851	328,618	801,972
North Carolina	1,061,471	455,833	206,970	189,548	209,120
North Dakota	75,800	28,316	13,048	13,395	21,040
Ohio	1,363,060	532,399	183,472	190,520	456,669
Oklahoma	404,643	188,658	92,233	79,880	43,871
Oregon	401,851	148,920	77,975	66,546	108,410
Pennsylvania	1,489,149	507,619	196,275	236,252	549,003
Rhode Island	129,094	41,592	15,889	15,456	56,157
South Carolina	480,334	207,446	94,434	86,911	91,542
South Dakota	83,527	29,856	16,673	14,796	22,202
Tennessee	715,897	332,467	130,366	134,091	118,974
Texas	2,456,387	1,176,802	478,946	426,228	374,411
Utah	198,661	66,063	33,823	39,940	58,835
Vermont	75,913	22,377	10,988	13,123	29,425
Virginia	816,492	217,216	98,088	119,324	381,864
Washington	674,016	208,311	101,162	96,251	268,292
West Virginia	204,218	106,442	40,062	48,424	9,290
Wisconsin	661,315	207,459	103,466	95,510	254,880
Wyoming	56,989	19,632	9,182	9,543	18,632
All States	33,819,278	12,740,124	5,278,640	5,266,896	10,533,618

<sup>1/</sup>State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

<sup>2/</sup>The greater of 60 percent of State median income estimates or 150 percent of the HHS Poverty Guidelines.

<sup>3/</sup>The three year CPS ASEC average estimate of the total number of all U.S. households is 115,726,411.



**LIHEAP Home Energy Notebook for FY 2008: Appendix B: Income Eligible Household Estimates**

**Table B-4. Average of 2006, 2007, and 2008 State-level estimates of the number of LIHEAP income eligible households using the State maximum LIHEAP income standards<sup>1/ 2/</sup>**

(Three-Year Average of CPS ASEC 2006-2008)

State	State Income Guidelines for 4-Person Household as % of HHS Poverty Guidelines	Total number of LIHEAP eligible Households <sup>3/</sup>	Number of LIHEAP eligible households by HHS poverty intervals			
			At or below poverty guidelines	>100%-125% poverty guidelines	>125%-150% poverty guidelines	Over 150% poverty guidelines
Alabama	150	447,785	268,655	90,285	88,845	0
Alaska	150	52,832	28,735	11,785	12,312	0
Arizona	150	484,240	276,456	107,222	100,562	0
Arkansas	125	215,776	152,005	63,771	0	0
California	<sup>4/</sup> 205	3,838,847	1,250,875	683,775	604,242	1,299,956
Colorado	185	411,897	174,858	72,016	73,174	91,850
Connecticut	<sup>5/</sup> 150	269,722	112,788	49,257	53,170	54,507
Delaware	200	78,174	25,826	10,955	13,127	28,266
District of Columbia	<sup>4/</sup> 146	69,561	40,304	10,232	8,590	10,435
Florida	150	1,481,139	801,536	322,202	357,400	0
Georgia	150	723,614	421,874	147,171	154,568	0
Hawaii	150	78,555	44,781	18,589	15,185	0
Idaho	150	106,481	48,832	27,618	30,030	0
Illinois	150	863,177	478,932	185,933	198,312	0
Indiana	150	493,534	274,514	94,248	124,771	0
Iowa	150	209,055	108,296	44,717	56,041	0
Kansas	130	166,305	113,219	41,872	11,214	0
Kentucky	130	355,374	242,598	96,132	16,643	0
Louisiana	<sup>4/</sup> 163	475,551	246,416	91,088	89,243	48,804
Maine	<sup>6/</sup> 150	117,492	56,366	21,945	28,121	11,060
Maryland	175	359,590	167,952	59,356	71,641	60,642
Massachusetts	<sup>7/</sup> 200	664,852	284,158	103,708	92,455	184,531
Michigan	110	502,844	439,448	63,396	0	0
Minnesota	<sup>4/</sup> 187	456,663	144,422	75,157	72,476	164,608
Mississippi	150	330,764	203,166	66,008	61,590	0
Missouri	125	352,673	242,575	110,098	0	0
Montana	150	86,124	47,064	23,967	15,093	0
Nebraska	116	79,129	60,197	18,932	0	0
Nevada	150	154,526	80,640	31,926	41,960	0
New Hampshire	185	85,689	28,881	17,649	16,139	23,019
New Jersey	175	583,060	258,259	109,985	111,478	103,338
New Mexico	150	199,723	111,815	42,373	45,535	0
New York	<sup>4/ 8/</sup> 210	2,478,716	1,006,275	341,851	328,618	801,972
North Carolina	110	533,117	455,833	77,283	0	0
North Dakota	<sup>4/</sup> 174	75,800	28,316	13,048	13,395	21,040
Ohio	175	1,118,437	532,399	183,472	190,520	212,046
Oklahoma	110	224,362	188,658	35,703	0	0
Oregon	<sup>4/</sup> 180	401,851	148,920	77,975	66,546	108,410
Pennsylvania	150	940,146	507,619	196,275	236,252	0
Rhode Island	<sup>4/</sup> 227	129,094	41,592	15,889	15,456	56,157
South Carolina	150	388,791	207,446	94,434	86,911	0
South Dakota	160	67,517	29,856	16,673	14,796	6,193
Tennessee	125	462,832	332,467	130,366	0	0
Texas	125	1,655,748	1,176,802	478,946	0	0
Utah	125	99,886	66,063	33,823	0	0
Vermont	125	33,365	22,377	10,988	0	0
Virginia	130	340,292	217,216	98,088	24,988	0
Washington	125	309,473	208,311	101,162	0	0
West Virginia	130	156,015	106,442	40,062	9,511	0
Wisconsin	150	406,435	207,459	103,466	95,510	0
Wyoming	<sup>4/</sup> 183	56,933	19,632	9,182	9,486	18,632
All States	Not applicable	24,673,553	12,740,124	4,972,056	3,655,908	3,305,466

<sup>1/</sup> State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

<sup>2/</sup> State income guidelines can vary from 110 percent of the HHS Poverty Guidelines up to the Federal maximum LIHEAP income standard. The State maximum LIHEAP income standards for a family of four were obtained from ACF's LIHEAP grantee survey.

<sup>3/</sup> The three year CPS ASEC average estimate of the total number of all U.S. households is 115,726,411.

<sup>4/</sup> These States use a percent of State median income. The figures reported are the conversion to a percent of the HHS Poverty Guidelines.

<sup>5/</sup> 200 percent of the HHS Poverty Guidelines if a household member is elderly or disabled.

<sup>6/</sup> 170 percent of the HHS Poverty Guidelines if a household member is susceptible to hypothermia (elderly over 60 or children under 2).

<sup>7/</sup> 150 percent of the HHS Poverty Guidelines whenever 200 percent of the HHS Poverty Guidelines exceeds 60 percent of the State median income.

<sup>8/</sup> 150 percent of the HHS Poverty Guidelines for a family size of 11 or more.

**LIHEAP Home Energy Notebook for FY 2008: Appendix B: Income Eligible Household Estimates**

**Table B-5. Average of 2005, 2006, and 2007 State-level estimates of the number of LIHEAP income eligible households using the Federal maximum LIHEAP income standard by vulnerability category<sup>1/</sup>**  
<sup>2/</sup>

(Three-Year Average of the ACS 2005-2007)

State	Total number of LIHEAP eligible households <sup>2/</sup>	LIHEAP eligible households by vulnerability category <sup>4/</sup>			LIHEAP eligible households with no vulnerable members
		At least one person 60+ years	At least one child less than 6 yrs. old	At least one person with a disability <sup>5/</sup>	
Alabama	581,226	213,696	106,262	235,233	172,824
Alaska	60,389	14,880	16,283	15,867	23,121
Arizona	552,379	186,179	131,226	148,975	183,091
Arkansas	321,981	116,269	64,025	135,239	88,407
California	3,403,230	1,142,126	807,155	933,459	1,170,996
Colorado	510,809	151,531	108,911	118,618	203,055
Connecticut	375,961	161,487	59,048	109,181	116,596
Delaware	87,917	35,858	17,988	24,892	25,407
District of Columbia	64,136	21,817	9,967	20,144	24,600
Florida	1,842,493	805,418	315,724	557,130	556,355
Georgia	952,578	307,271	212,069	312,138	323,156
Hawaii	103,926	41,134	19,700	27,825	35,054
Idaho	140,280	43,620	35,233	40,083	44,898
Illinois	1,393,107	513,525	279,255	389,092	477,882
Indiana	702,210	247,974	139,518	223,336	228,718
Iowa	340,260	131,369	59,989	100,061	112,453
Kansas	313,971	105,877	65,532	88,858	109,864
Kentucky	512,456	184,641	90,976	232,369	135,574
Louisiana	499,502	177,602	99,902	179,460	158,887
Maine	153,761	65,698	21,889	59,842	40,472
Maryland	541,862	210,217	101,312	149,693	183,849
Massachusetts	739,325	322,406	107,755	246,135	219,241
Michigan	1,204,341	439,767	217,246	393,925	396,372
Minnesota	565,469	218,462	104,044	146,680	189,007
Mississippi	354,579	127,523	71,527	156,426	98,248
Missouri	694,085	255,391	133,276	244,449	213,697
Montana	93,209	31,479	14,730	28,509	34,755
Nebraska	194,330	69,324	40,086	53,324	65,167
Nevada	206,512	70,817	47,390	50,101	70,924
New Hampshire	125,092	52,444	17,030	38,489	39,189
New Jersey	928,779	404,300	161,113	253,989	294,639
New Mexico	200,645	63,953	44,592	59,834	68,800
New York	2,114,453	848,341	370,362	668,709	669,932
North Carolina	1,016,380	358,764	203,792	353,580	326,782
North Dakota	76,204	30,746	10,919	20,824	27,961
Ohio	1,376,968	507,964	254,835	462,517	428,839
Oklahoma	398,250	133,316	87,367	143,762	121,596
Oregon	399,112	133,990	72,802	118,924	143,414
Pennsylvania	1,484,126	652,951	219,877	507,784	426,837
Rhode Island	118,664	50,063	18,123	41,022	34,282
South Carolina	488,039	181,277	91,813	175,527	151,164
South Dakota	89,500	34,612	16,062	25,253	30,058
Tennessee	708,071	258,899	134,993	280,706	208,362
Texas	2,314,860	693,630	616,742	644,491	803,786
Utah	201,079	51,161	67,375	46,892	65,205
Vermont	69,073	25,519	10,272	23,087	22,930
Virginia	750,906	284,357	135,276	239,113	249,422
Washington	667,243	217,152	133,103	209,244	227,103
West Virginia	223,402	84,148	35,299	107,182	55,235
Wisconsin	634,579	242,150	108,645	181,475	212,046
Wyoming	47,408	17,329	8,631	13,656	16,489
All States	31,939,117	11,740,426	6,317,043	10,037,102	10,326,742

<sup>1/</sup>State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

<sup>2/</sup>The greater of 60 percent of State median income estimates or 150 percent of the HHS Poverty Guidelines.

<sup>3/</sup>The three-year ACS average estimate of the total number of all U.S. households is 111,688,170.

<sup>4/</sup>A household can be counted under more than one vulnerability category.

<sup>5/</sup>A person with a disability is defined as anyone 16 years or older who reported having difficulty working due to a "physical, mental, or emotional condition lasting 6 months or more," as reported on the ACS. The definition also includes 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.

**LIHEAP Home Energy Notebook for FY 2008: Appendix B: Income Eligible Household Estimates**

**Table B-6. Average of 2005, 2006, and 2007 State-level estimates of the number of LIHEAP income eligible households using State LIHEAP income standards by vulnerability category<sup>1/ 2/</sup>**

(Three-Year Average of the ACS 2005-2007)

State	State Income Guidelines for 4-Person Household as % of HHS Poverty Guidelines	Total number of LIHEAP eligible households <sup>3/</sup>	LIHEAP eligible households by vulnerability category <sup>4/</sup>			LIHEAP eligible households with no vulnerable members
			At least one person 60+	At least one child less than 6 yrs. old	At least one person with a disability <sup>5/</sup>	
Alabama	150	499,498	180,601	94,627	207,039	145,467
Alaska	150	47,047	11,515	12,744	13,490	17,389
Arizona	150	449,206	143,851	112,833	123,556	147,804
Arkansas	125	247,880	85,809	52,180	107,248	65,790
California	<sup>6/</sup> 205	3,400,610	1,141,376	804,716	932,656	1,170,901
Colorado	185	416,003	122,285	93,921	101,650	158,198
Connecticut	<sup>7/</sup> 150	229,434	114,369	31,724	86,533	50,621
Delaware	200	77,616	30,727	16,680	22,762	22,034
District of Columbia	<sup>6/</sup> 146	64,136	21,817	9,967	20,144	24,600
Florida	150	1,437,577	611,574	259,916	449,829	423,684
Georgia	150	740,465	237,696	170,064	255,498	239,088
Hawaii	150	76,235	30,376	14,545	21,899	24,432
Idaho	150	118,068	36,366	30,797	34,974	36,053
Illinois	150	881,572	299,358	191,667	265,335	294,661
Indiana	150	478,193	156,635	101,589	163,846	150,763
Iowa	150	235,363	87,359	44,570	75,427	74,359
Kansas	130	174,236	53,774	38,989	54,943	58,434
Kentucky	130	380,422	127,502	71,589	181,432	95,738
Louisiana	<sup>6/</sup> 163	498,717	177,354	99,243	179,292	158,803
Maine	<sup>8/</sup> 150	124,757	56,986	18,435	51,466	28,668
Maryland	175	328,195	129,820	61,946	105,720	100,138
Massachusetts	<sup>9/</sup> 200	564,121	246,781	81,546	203,546	156,423
Michigan	110	526,177	146,697	112,191	188,433	175,047
Minnesota	<sup>6/</sup> 187	445,184	174,107	80,664	125,679	141,723
Mississippi	150	351,425	125,486	71,527	155,055	97,513
Missouri	125	399,065	131,189	84,278	153,135	118,169
Montana	150	84,341	28,055	13,712	26,025	31,266
Nebraska	116	92,249	29,960	21,684	29,382	28,065
Nevada	150	150,628	49,209	36,713	38,676	49,842
New Hampshire	185	86,398	36,104	11,936	30,615	23,852
New Jersey	175	556,858	242,859	102,520	173,182	159,720
New Mexico	150	197,098	62,039	44,515	58,819	67,517
New York	<sup>6/ 10/</sup> 210	2,114,096	848,256	370,006	668,686	669,932
North Carolina	110	542,445	168,461	117,920	200,540	172,686
North Dakota	<sup>6/</sup> 174	76,160	30,746	10,875	20,824	27,961
Ohio	175	1,145,633	402,558	225,524	400,419	349,399
Oklahoma	110	239,793	69,255	55,996	91,255	72,916
Oregon	<sup>6/</sup> 180	398,917	133,990	72,633	118,790	143,388
Pennsylvania	150	973,690	402,758	156,245	362,999	267,302
Rhode Island	<sup>6/</sup> 227	118,664	50,063	18,123	41,022	34,282
South Carolina	150	411,502	150,079	80,286	153,131	123,527
South Dakota	160	75,352	29,122	14,184	22,006	24,194
Tennessee	125	478,230	164,209	97,178	202,253	132,950
Texas	125	1,597,621	451,545	457,085	464,525	533,301
Utah	125	104,443	23,412	34,426	27,450	33,958
Vermont	125	33,787	11,705	5,287	13,125	10,026
Virginia	130	385,772	145,787	68,966	140,645	118,409
Washington	125	336,955	95,189	70,857	121,882	109,362
West Virginia	130	184,104	63,854	31,537	89,062	45,935
Wisconsin	150	392,895	141,877	70,348	127,497	125,279
Wyoming	<sup>6/</sup> 183	47,408	17,329	8,631	13,656	16,489
All States	Not applicable	24,016,244	8,529,833	4,960,136	7,917,055	7,548,054

<sup>1/</sup>State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

<sup>2/</sup>State income guidelines can vary from 110 percent of the HHS Poverty Guidelines up to the Federal maximum LIHEAP income standard. The State maximum LIHEAP income standards for a family of four were obtained from ACF's LIHEAP grantee survey.

<sup>3/</sup>The three-year ACS average estimate of the total number of all U.S. households is 111,688,170.

<sup>4/</sup>A household can be counted under more than one vulnerability category.

<sup>5/</sup>A person with a disability is defined as anyone 16 years or older who reported having difficulty working due to a "physical, mental, or emotional condition lasting 6 months or more," as reported on the ACS. The definition also includes 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.

<sup>6/</sup>These States use a percent of State median income. The figures reported are the conversion to a percent of the HHS Poverty Guidelines.

<sup>7/</sup>200 percent of the HHS Poverty Guidelines if a household member is elderly or disabled.

<sup>8/</sup>170 percent of the HHS Poverty Guidelines if a household member is susceptible to hypothermia (elderly over 60 or children under 2).

<sup>9/</sup>150 percent of the HHS Poverty Guidelines whenever 200 percent of the HHS Poverty Guidelines exceeds 60 percent of the State median income.

<sup>10/</sup>150 percent of the HHS Poverty Guidelines for a family size of 11 or more.

**LIHEAP Home Energy Notebook for FY 2008: Appendix B: Income Eligible Household Estimates**

**Table B-7. Average of 2005, 2006, and 2007 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<sup>1/ 2/</sup>**

(Three-Year Average of the ACS 2005-2007)

State	Total number of LIHEAP eligible households <sup>3/</sup>	Number of LIHEAP eligible households by intervals of HHS Poverty Guidelines			
		At or below poverty guidelines	>100% - 125% poverty guidelines	>125% - 150% poverty guidelines	Over 150% poverty guidelines
Alabama	581,226	292,272	107,109	100,117	81,728
Alaska	60,389	26,149	10,545	10,353	13,341
Arizona	552,379	248,717	97,521	102,968	103,173
Arkansas	321,981	178,925	68,955	64,668	9,433
California	3,403,230	1,233,697	565,639	524,813	1,079,080
Colorado	510,809	185,017	68,609	66,213	190,970
Connecticut	375,961	103,313	39,198	39,482	193,968
Delaware	87,917	27,997	11,668	11,982	36,270
District of Columbia	64,136	37,358	8,192	8,080	10,506
Florida	1,842,493	777,102	324,344	336,131	404,916
Georgia	952,578	435,508	155,478	149,479	212,113
Hawaii	103,926	44,598	14,527	17,110	27,691
Idaho	140,280	61,848	28,239	27,980	22,212
Illinois	1,393,107	511,493	184,968	185,110	511,535
Indiana	702,210	265,517	105,820	106,856	224,017
Iowa	340,260	123,511	54,165	57,687	104,897
Kansas	313,971	113,594	49,768	52,720	97,890
Kentucky	512,456	270,465	91,580	86,756	63,655
Louisiana	499,502	284,501	94,146	85,153	35,702
Maine	153,761	60,232	26,579	26,618	40,332
Maryland	541,862	149,492	58,403	61,126	272,842
Massachusetts	739,325	245,600	82,045	81,877	329,803
Michigan	1,204,341	461,110	163,748	164,239	415,244
Minnesota	565,469	168,787	70,052	72,578	254,051
Mississippi	354,579	210,967	76,409	64,049	3,154
Missouri	694,085	288,467	110,598	107,958	187,061
Montana	93,209	45,828	19,566	18,947	8,868
Nebraska	194,330	72,780	32,218	31,062	58,270
Nevada	206,512	82,172	32,790	35,666	55,884
New Hampshire	125,092	34,635	14,434	13,854	62,169
New Jersey	928,779	255,655	98,565	100,222	474,337
New Mexico	200,645	115,896	42,116	39,086	3,547
New York	2,114,453	901,951	290,497	288,610	633,394
North Carolina	1,016,380	471,067	179,963	172,283	193,067
North Dakota	76,204	30,898	12,839	13,849	18,618
Ohio	1,376,968	542,007	199,597	203,000	432,365
Oklahoma	398,250	209,461	78,811	76,613	33,365
Oregon	399,112	164,340	66,763	67,393	100,615
Pennsylvania	1,484,126	536,308	218,027	219,356	510,436
Rhode Island	118,664	43,272	18,089	17,302	40,000
South Carolina	488,039	237,000	89,944	84,558	76,537
South Dakota	89,500	38,394	13,478	15,743	21,885
Tennessee	708,071	352,199	126,031	124,320	105,521
Texas	2,314,860	1,178,142	419,479	409,298	307,941
Utah	201,079	71,196	33,247	37,862	58,774
Vermont	69,073	23,626	10,161	10,392	24,894
Virginia	750,906	264,173	100,831	97,913	287,989
Washington	667,243	245,703	91,252	93,088	237,201
West Virginia	223,402	125,905	48,743	44,268	4,485
Wisconsin	634,579	204,847	94,173	93,875	241,684
Wyoming	47,408	16,629	7,429	10,043	13,307
All States	31,939,117	13,070,321	5,007,349	4,930,709	8,930,737

<sup>1/</sup>State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

<sup>2/</sup>The greater of 60 percent of State median income estimates or 150 percent of the HHS Poverty Guidelines.

<sup>3/</sup>The three-year ACS average estimate of the total number of all U.S. households is 111,688,170.

**LIHEAP Home Energy Notebook for FY 2008: Appendix B: Income Eligible Household Estimates**

**Table B-8. Average of 2005, 2006, and 2007 State-level estimates of the number of LIHEAP income eligible households using the State maximum LIHEAP income standards<sup>1/ 2/</sup>**

(Three-Year Average of the ACS 2005-2007)

State	State Income Guidelines for 4-Person Household as % of HHS Poverty Guidelines	Total number of LIHEAP eligible Households <sup>2/</sup>	Number of LIHEAP eligible households by HHS poverty intervals			
			At or below poverty guidelines	>100%-125% poverty guidelines	>125%-150% poverty guidelines	Over 150% poverty guidelines
Alabama	150	499,498	292,272	107,109	100,117	0
Alaska	150	47,047	26,149	10,545	10,353	0
Arizona	150	449,206	248,717	97,521	102,968	0
Arkansas	125	247,880	178,925	68,955	0	0
California	<sup>4/</sup> 205	3,400,610	1,233,697	565,403	522,429	1,079,080
Colorado	185	416,003	185,017	68,609	66,213	96,164
Connecticut	<sup>5/</sup> 150	229,434	103,313	39,198	39,482	47,441
Delaware	200	77,616	27,997	11,668	11,982	25,969
District of Columbia	<sup>4/</sup> 146	64,136	37,358	8,192	8,080	10,506
Florida	150	1,437,577	777,102	324,344	336,131	0
Georgia	150	740,465	435,508	155,478	149,479	0
Hawaii	150	76,235	44,598	14,527	17,110	0
Idaho	150	118,068	61,848	28,239	27,980	0
Illinois	150	881,572	511,493	184,968	185,110	0
Indiana	150	478,193	265,517	105,820	106,856	0
Iowa	150	235,363	123,511	54,165	57,687	0
Kansas	130	174,236	113,594	49,768	10,874	0
Kentucky	130	380,422	270,465	91,580	18,377	0
Louisiana	<sup>4/</sup> 163	498,717	284,501	94,102	84,412	35,702
Maine	<sup>6/</sup> 150	124,757	60,232	26,579	26,618	11,328
Maryland	175	328,195	149,492	58,403	61,126	59,175
Massachusetts	<sup>7/</sup> 200	564,121	245,600	82,045	81,877	154,599
Michigan	110	526,177	461,110	65,067	0	0
Minnesota	<sup>4/</sup> 187	445,184	168,787	70,043	72,480	133,874
Mississippi	150	351,425	210,967	76,409	64,049	0
Missouri	125	399,065	288,467	110,598	0	0
Montana	150	84,341	45,828	19,566	18,947	0
Nebraska	116	92,249	72,780	19,470	0	0
Nevada	150	150,628	82,172	32,790	35,666	0
New Hampshire	185	86,398	34,635	14,434	13,854	23,475
New Jersey	175	556,858	255,655	98,565	100,222	102,416
New Mexico	150	197,098	115,896	42,116	39,086	0
New York	<sup>4/ 8/</sup> 210	2,114,096	901,951	290,497	288,254	633,394
North Carolina	110	542,445	471,067	71,378	0	0
North Dakota	<sup>4/</sup> 174	76,160	30,898	12,795	13,849	18,618
Ohio	175	1,145,633	542,007	199,597	203,000	201,030
Oklahoma	110	239,793	209,461	30,332	0	0
Oregon	<sup>4/</sup> 180	398,917	164,340	66,661	67,300	100,615
Pennsylvania	150	973,690	536,308	218,027	219,356	0
Rhode Island	<sup>4/</sup> 227	118,664	43,272	18,089	17,302	40,000
South Carolina	150	411,502	237,000	89,944	84,558	0
South Dakota	160	75,352	38,394	13,478	15,743	7,737
Tennessee	125	478,230	352,199	126,031	0	0
Texas	125	1,597,621	1,178,142	419,479	0	0
Utah	125	104,443	71,196	33,247	0	0
Vermont	125	33,787	23,626	10,161	0	0
Virginia	130	385,772	264,173	100,831	20,768	0
Washington	125	336,955	245,703	91,252	0	0
West Virginia	130	184,104	125,905	48,743	9,456	0
Wisconsin	150	392,895	204,847	94,173	93,875	0
Wyoming	<sup>4/</sup> 183	47,408	16,629	7,429	10,043	13,307
All States	Not applicable	24,016,244	13,070,321	4,738,422	3,413,071	2,794,429

<sup>1/</sup>State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

<sup>2/</sup>State income guidelines can vary from 110 percent of the HHS Poverty Guidelines up to the Federal maximum LIHEAP income standard. The State maximum LIHEAP income standards for a family of four were obtained from ACF's LIHEAP grantee survey.

<sup>3/</sup>The three-year ACS average estimate of the total number of all U.S. households is 111,688,170.

<sup>4/</sup>These States use a percent of State median income. The figures reported are the conversion to a percent of the HHS Poverty Guidelines.

<sup>5/</sup>200 percent of the HHS Poverty Guidelines if a household member is elderly or disabled.

<sup>6/</sup>170 percent of the HHS Poverty Guidelines if a household member is susceptible to hypothermia (elderly over 60 or children under 2).

<sup>7/</sup>150 percent of the HHS Poverty Guidelines whenever 200 percent of the HHS Poverty Guidelines exceeds 60 percent of the State median income.

<sup>8/</sup>150 percent of the HHS Poverty Guidelines for a family size of 11 or more.