

LIHEAP Home Energy Notebook

For Fiscal Year 2009



**U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES
Administration for Children and Families
Office of Community Services
Division of Energy Assistance
September 2011**

LIHEAP Home Energy Notebook

For Fiscal Year 2009

This document has been prepared for the Office of Community Services' Division of Energy Assistance by APPRISE Incorporated under contract #HHSP233201000237M. The statements, findings, conclusions, and recommendations are solely those of analysts from APPRISE and do not necessarily reflect the views of EIA or HHS.

Copies of this document can be obtained by contacting Peter Edelman of the Division of Energy Assistance at the following address:

Administration for Children and Families
Office of Community Services
Division of Energy Assistance
370 L'Enfant Promenade SW
Washington, DC 20447

E-mail: peter.edelman@acf.hhs.gov
Web site: <http://www.acf.hhs.gov/programs/ocs/liheap/>

September 2011

Table of Contents

Figures and Tables.....	ii
List of Acronyms and Abbreviations	v
Executive Summary.....	i
Home energy data	i
Low income home energy trends	iv
Trends in LIHEAP.....	xi
Federal LIHEAP targeting performance.....	xii
SIPP study of energy affordability	xiv
I. Introduction.....	1
Purpose of Notebook.....	1
Organization of Notebook	2
II. Home Energy Data	3
Residential energy data	3
Home heating data	6
Home cooling data.....	9
III. Low Income Home Energy Trends.....	11
Trends in consumption, expenditures, and burden	13
Analysis of energy price and energy efficiency trends	25
Trends in LIHEAP.....	30
Analysis of LIHEAP benefits	34
IV. Federal LIHEAP Targeting Performance.....	37
LIHEAP program goals and performance goals	37
Performance measures	38
Performance measurement research.....	40
Uses of LIHEAP performance data.....	45
Targeting performance measurement issues.....	46
V. SIPP Study of Energy Affordability	48
Study goals.....	48
Level and type of energy affordability problems	49
Geographic and demographic dimensions of energy affordability problems	51
Analysis of income dynamics and assets for elderly households	55
Analysis of energy affordability problems by income group	58
Study implications.....	60
Appendix A: Home Energy Estimates	62
Description of RECS.....	62
Strengths and limitations of RECS data.....	63
Average home energy consumption and expenditures	64
Energy burden.....	64
Projecting energy consumption and expenditures.....	67
Appendix B: Income Eligible Household Estimates	80

Figures and Tables

Figure 1. Percent of U.S. residential energy expenditures by low income households, by end use, FY 2009.....	ii
Figure 2. Mean home heating and home cooling expenditures by all households, non low income households, low income households, and LIHEAP recipient households, FY 2009.....	iii
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 2009.....	iv
Figure 4. Percent of low income households using electricity and fuel oil as main heating fuels, 1979 to 2005.....	v
Figure 5. Percent of low income households using central air-conditioning, 1979 to 2005	vi
Figure 6. Mean residential energy consumption (in mmbTUs) per low income household, 1979 to FY 2009.....	vii
Figure 7. Mean residential energy expenditures for low income households, 1979 to FY 2009	viii
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 2009.....	ix
Figure 9. Shifts in composite energy price index and Consumer Price Index (CPI), 1979 to FY 2009.....	x
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 2009.....	xi
Figure 11. Number of LIHEAP/LIHEAP income eligible and heating and/or winter crisis assistance recipient households, FY 1981 to FY 2009.....	xii
Table 1. Energy Affordability Problems for Low Income Households, SIPP vs. RECS, 2005	xvi
Figure 12. Energy Affordability Problems by Income Group, SIPP, 2005.....	xix
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 2009	5
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 2009.....	6
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	6
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 2009.....	8
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	9
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 2009	10
Table 3-1. Definition of special terms.....	12
Table 3-2. Data used for the study of low income home energy trends	13
Figure 3-1. Main heating fuel for households with incomes at or below 150 percent of HHS' poverty guidelines, 1979 to 2005	14
Figure 3-2. Air-conditioning type for households with incomes at or below 150 percent of HHS' poverty guidelines, 1979 to 2005	14
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 2009.....	15
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 2009.....	16
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 2009.....	17
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 2009.....	18
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 2009.....	19
Figure 3-8. Number of low income households spending over 5 percent and 10 percent of income on home energy, 1979 to FY 2009.....	20

LIHEAP Home Energy Notebook for FY 2009: Table of Contents

Figure 3-9. Percent of low income households spending over 5 percent and 10 percent of income on home energy, 1979 to FY 2009.....	20
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 2009.....	21
Figure 3-11. Number of low income households spending over 15 percent and 25 percent of income on residential energy, 1979 to FY 2009.....	22
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 2009.....	23
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 2009.....	24
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.....	25
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 2009.....	26
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 2009.....	27
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 2009.....	28
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 2009.....	29
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 2009.....	29
Figure 3-20. Percentage of LIEAP/LIHEAP Federally eligible households receiving LIEAP/LIHEAP heating and/or winter crisis assistance, FY 1981 to FY 2009.....	30
Figure 3-21. Number of households receiving LIEAP/LIHEAP heating and/or winter crisis assistance or cooling and/or summer crisis assistance, FY 1981 to FY 2009 ^{1/}	31
Figure 3-22. Funds used for LIEAP/LIHEAP fuel assistance, FY 1981 to FY 2009.....	32
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 2009.....	33
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 2009.....	33
Figure 3-25. Amount and percentage of total home heating billed amounts for LIEAP/LIHEAP income eligible households covered by LIEAP/LIHEAP heating and winter crisis benefits, FY 1981 to FY 2009.....	35
Figure 3-26. Mean group home heating burden for all households and LIEAP/LIHEAP heating and winter crisis recipient households, FY 1981 to FY 2009.....	36
Table 4-1. LIHEAP reciprocity targeting performance measures reported for FY 2003 – FY 2009.....	43
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.....	44
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.....	44
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.....	45
Table 5.1. Energy Affordability Questions in the SIPP and RECS.....	50
Table 5.2. Energy Affordability Problems for Low Income Households, SIPP vs. RECS, 2005.....	51
Table 5.3. Number and Percent of Low Income Households with Energy Affordability Problems by Census Region, SIPP vs. RECS, 2005.....	52
Table 5.4. Number and Percent of Low Income Households with Energy Affordability Problems by Poverty Guidelines, SIPP vs. RECS, 2005.....	53
Table 5.5 Number and Percent of Low Income Households with Energy Affordability Problems by Vulnerability Group, SIPP vs. RECS, 2005.....	53
Table 5.6. Average Net Worth for Elderly Low Income Households.....	56
Table 5.7. Average Net Worth for Non-Elderly Low Income Households.....	56
Table 5.8. Having Volatile Income for Elderly and Non-Elderly Low Income Households.....	58

LIHEAP Home Energy Notebook for FY 2009: Table of Contents

Table 5.9. Number of Households Having Energy Affordability Problems by Income Group, 2005	59
Figure 5.1. Energy Affordability Problems by Income Group, SIPP, 2005.....	60
Figure A-1. Distribution of LIHEAP income eligible households by home energy burden, 2005	66
Table A-1. National price factors for FY 2009	68
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 2009	70
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 2009.....	71
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 2009.....	72
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 2009.....	73
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	74
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 2009	75
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 2009.....	76
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 2009.....	77
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 2009.....	78
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 2009	79
Table B-1. State-level estimates of the number of LIHEAP income eligible households using the Federal maximum LIHEAP income standard of 75 percent of SMI by vulnerability category	81
Table B-2. State-level estimates of the number of LIHEAP income eligible households using the previous Federal maximum LIHEAP income standard by vulnerability category	82
Table B-3. State-level estimates of the number of LIHEAP income eligible households using State LIHEAP income standards by vulnerability category	83
Table B-4. State-level estimates of the number of LIHEAP income eligible households using the new (75 percent of SMI) Federal maximum LIHEAP income standard categorized by income as a percentage of HHS poverty guidelines.....	84
Table B-5. State-level estimates of the number of LIHEAP income eligible households using the previous Federal maximum LIHEAP income standard categorized by income as a percentage of HHS poverty guidelines	85
Table B-6. State-level estimates of the number of LIHEAP income eligible households using the State maximum LIHEAP income standards categorized by income as a percentage of HHS poverty guidelines	86

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 2009 residential energy consumption and expenditures figures for this report have been derived from the 2005 RECS data that were adjusted to reflect FY 2009 weather and fuel prices.

Residential energy data

In FY 2009, average residential energy expenditures for all households were \$2,180, and the mean individual energy burden was 7.2 percent of income.¹ Low income households had average energy expenditures of \$1,885, about 13.5 percent lower than the average for all households.^{2 3} The mean individual energy burden for low income households was 13.8 percent, nearly twice the mean individual energy burden of all households. LIHEAP recipient households had average residential energy expenditures of \$2,087, almost 10 percent higher than the average for all low income households. The mean individual energy burden for LIHEAP recipients was 16.4 percent, 9.2 percentage points higher than the mean individual energy burden for all households and 2.6 percentage points higher than the mean individual energy burden for low income households.

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

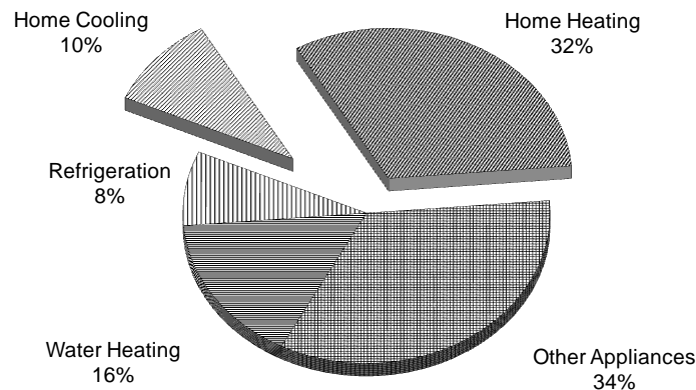
² Unless otherwise indicated, “low income” refers to households with income at or below the Federal maximum LIHEAP eligibility standard (i.e., the greater of 150 percent of HHS’s poverty income guidelines and 60 percent of State median income). The terms “low income” and “LIHEAP income eligible” are,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

³ For fiscal year 2009, the Congress raised the Federal maximum LIHEAP income standard to the greater of 75% State median income or 150% of HHS Poverty Guidelines from the greater of 60% State median income or 150% of HHS Poverty Guidelines. To maintain comparability with the previous *Notebooks*, low income definition was kept the same as before.

Nationally, average residential energy expenditures for all households and for low income households stayed about the same in FY 2009 as in FY 2008. LIHEAP recipient households decreased theirs by only one percent, from \$2,104 in FY 2008 to \$2,087 in FY 2009. While average expenditures for households heating with natural gas and electricity increased from FY 2008 to FY 2009 due to a rise in prices for these fuels, they decreased for households heating with fuel oil, kerosene, or LPG due to a decline in prices for such fuels.

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 42 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 34 percent of residential energy expenditures.

Figure 1. Percent of U.S. residential energy expenditures by low income households, by end use, FY 2009



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 2009, as shown in Figures 2 and 3, average home heating expenditures for all households were \$631, and the mean individual home heating burden was 2.3 percent. Low income households had average home heating expenditures of \$600; this average was about 4.9 percent lower than that for all households. The mean individual home heating burden for low income households was 4.7 percent, more than twice as much as the mean individual home heating burden for all households. The average home heating expenditures for LIHEAP recipient households was \$816, 36 percent higher than the average for low income households and about 29 percent higher than the average for all households. Mean individual home heating burden for LIHEAP recipient households was 6.9 percent, 4.6 percentage points higher than the mean individual home heating burden for all

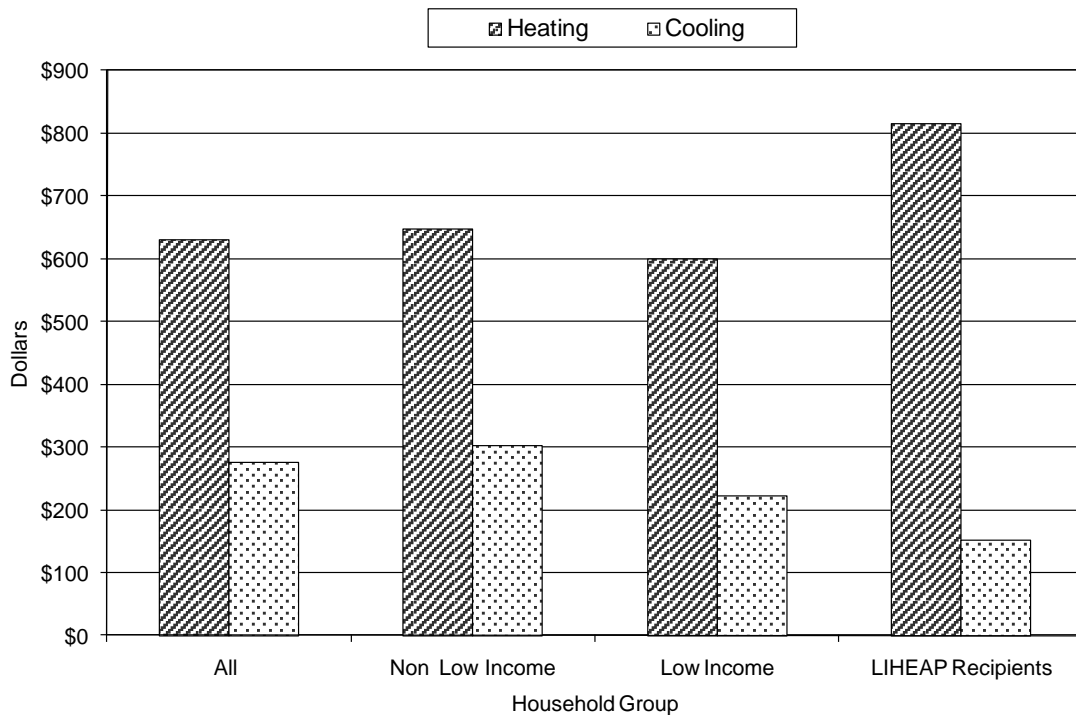
households and 2.2 percentage points higher than that for low income households. Average home heating expenditures (and consumption) for LIHEAP recipient households were greater than that for all low income households because LIHEAP heating assistance recipient households tend to live in colder climate regions.⁴

Home cooling data

In 2005, about 92 percent of all households cooled their homes using one of the methods recorded by the RECS.⁵ 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 2009, for households that cooled, average home cooling expenditures for all households were \$276, and the mean individual home cooling burden was 1.0 percent. Low income households had average home cooling expenditures of \$223; this average was about 19 percent lower than that for all households. The mean individual home cooling burden for low income households was 2.0 percent, twice as much as the mean individual home cooling burden for all households. Average home cooling expenditures for LIHEAP recipient households were \$151, over 32 percent lower than the average for low income households and almost 45 percent lower than the average for all households. The mean individual home cooling burden for LIHEAP recipient households was 1.1 percent, about 10 percent higher than the mean individual home cooling burden for all households.

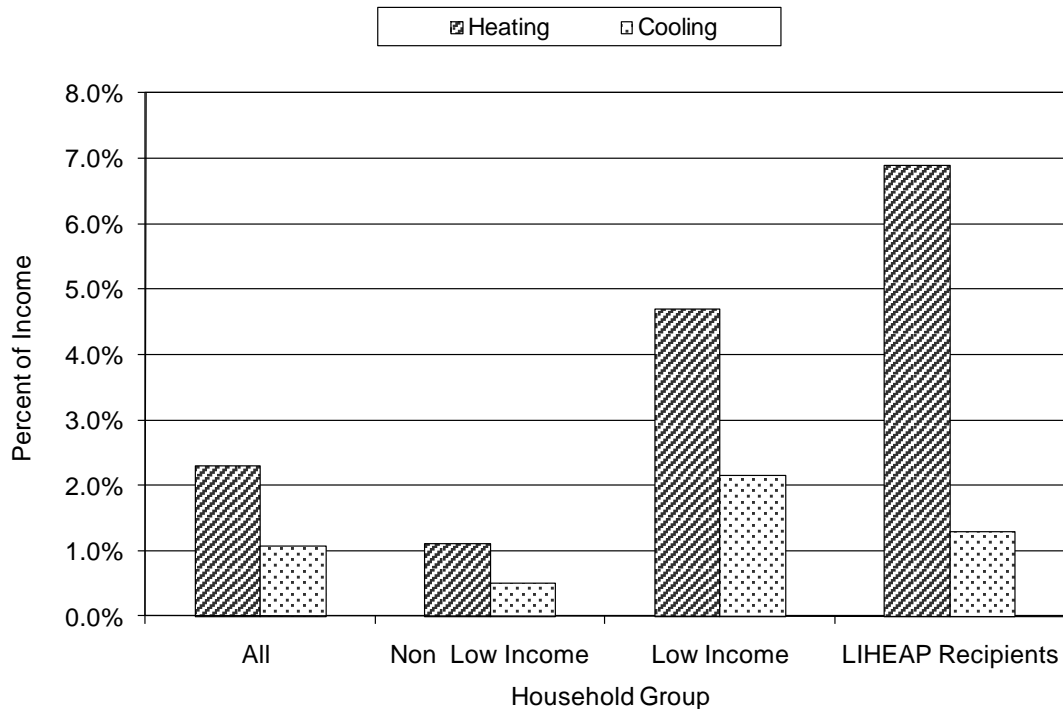
Figure 2. Mean home heating and home cooling expenditures by all households, non low income households, low income households, and LIHEAP recipient households, FY 2009



⁴ LIHEAP Home Energy Notebook for FY 2008

⁵ 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 2009



Low income home energy trends

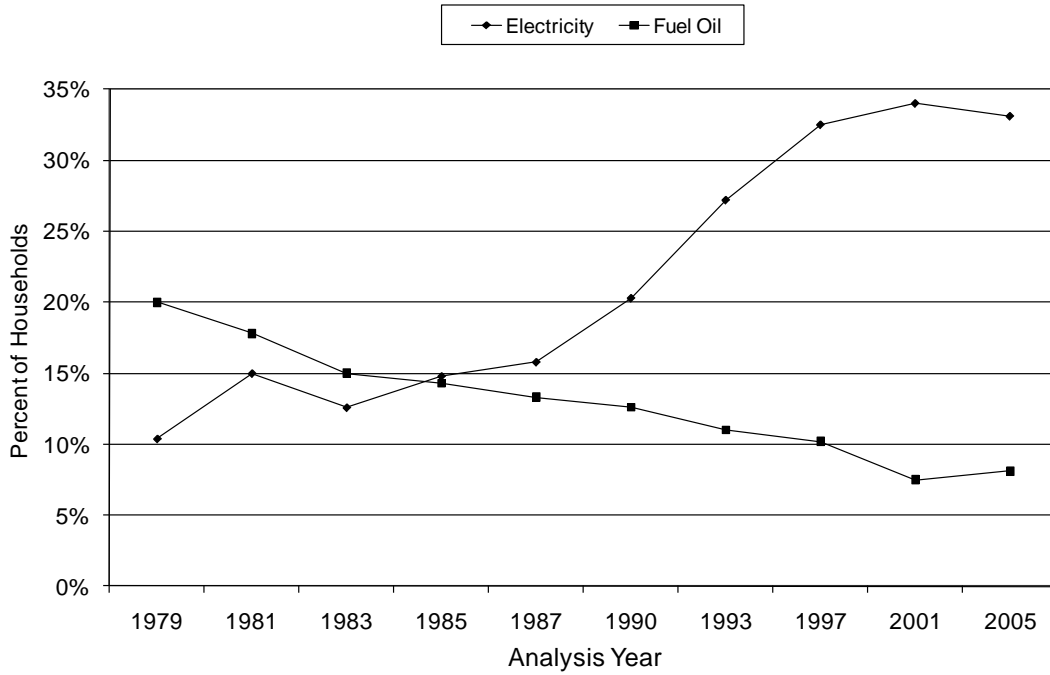
This section presents data on home energy trends for low income households from 1979 through 2005 or FY 2009, depending upon the latest year of availability.⁶ Statistics are derived from a series of national residential energy consumption surveys (including the RECS) and from HHS’ administrative statistics. 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.

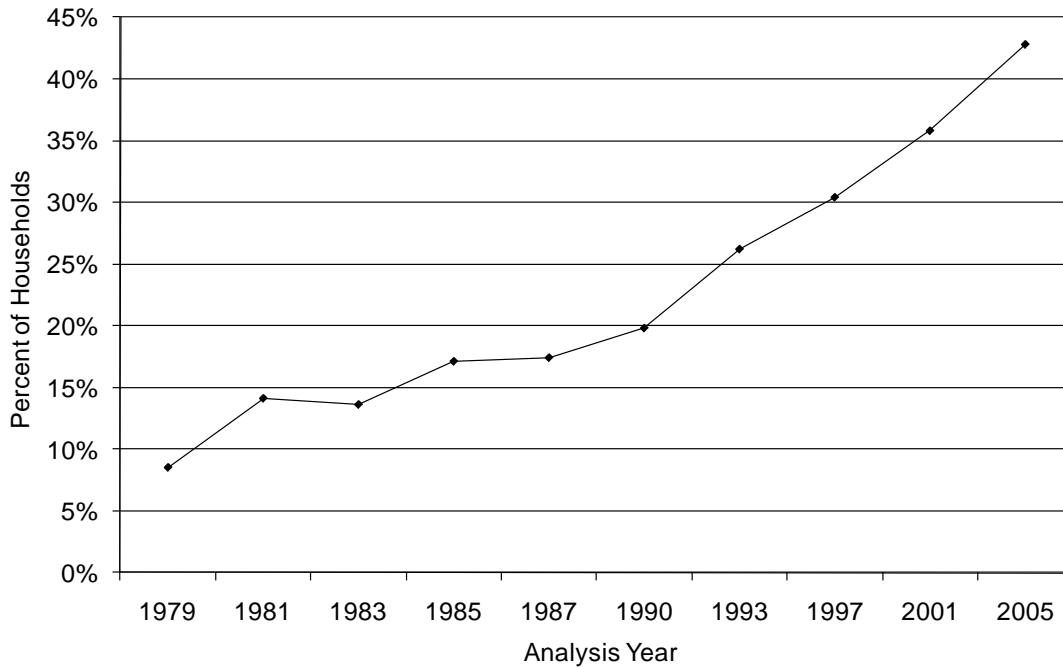
⁶In this section, low income households are defined as those households with incomes at or below 150 percent of HHS’ poverty guidelines.

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 percentage of households with central air-conditioning. The share of low income households who use central air-conditioning increased from 8.5 percent in 1979 to almost 43 percent in 2005.

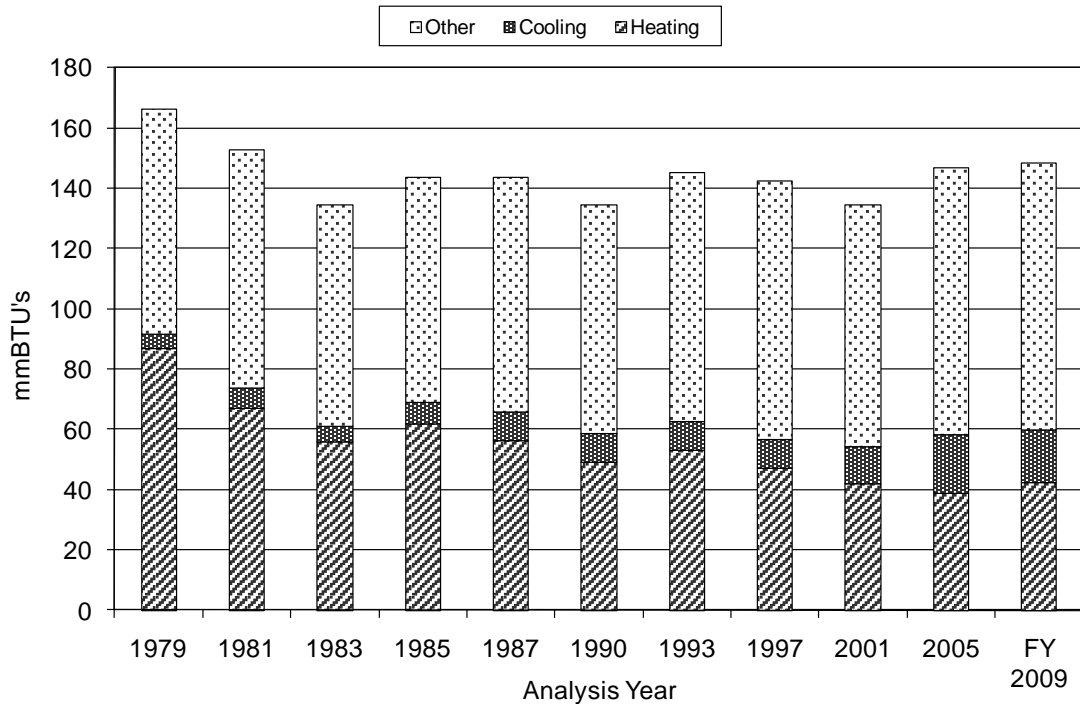
Figure 5. Percent of low income households using central air-conditioning, 1979 to 2005



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 2009, the use of energy for home heating, home cooling, and for other purposes, appears to have remained stable.

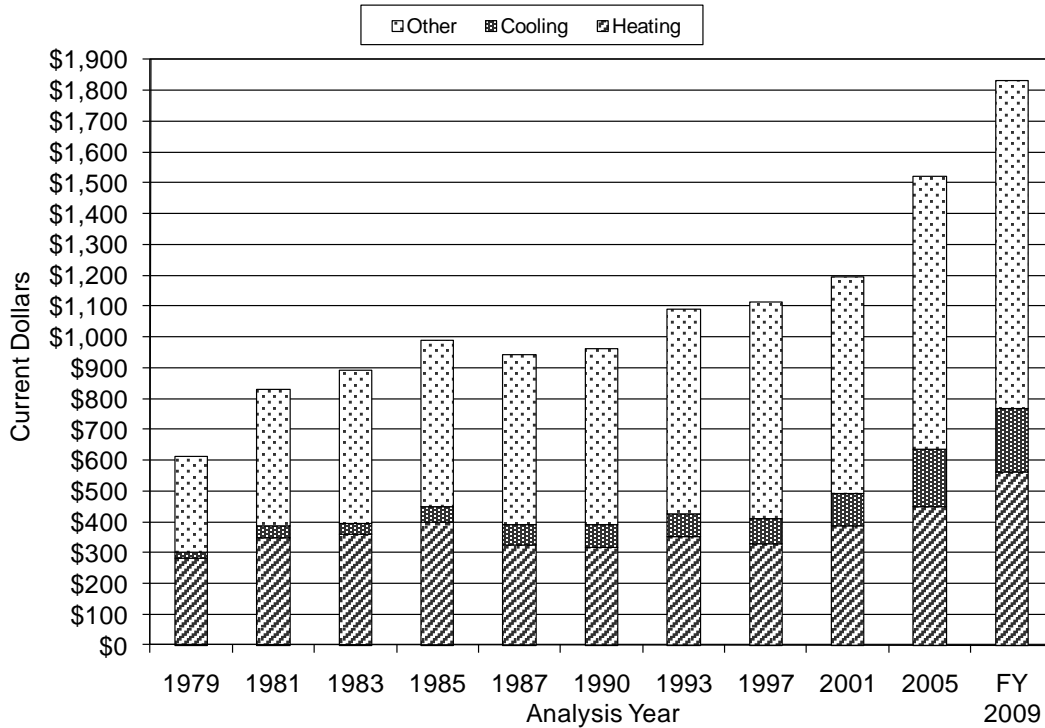
Figure 6. Mean residential energy consumption (in mmBTUs) per low income household, 1979 to FY 2009¹



¹ A British Thermal Unit (BTU) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MmBTUs 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 2009, mean expenditures for home heating rose by 25 percent, again due to higher fuel prices. Mean expenditures on uses other than home heating or home cooling rose continuously from 1979 to FY 2009. Mean expenditures on cooling rose from 1979 to 2005, and rose again by 10 percent from 2005 to FY 2009.

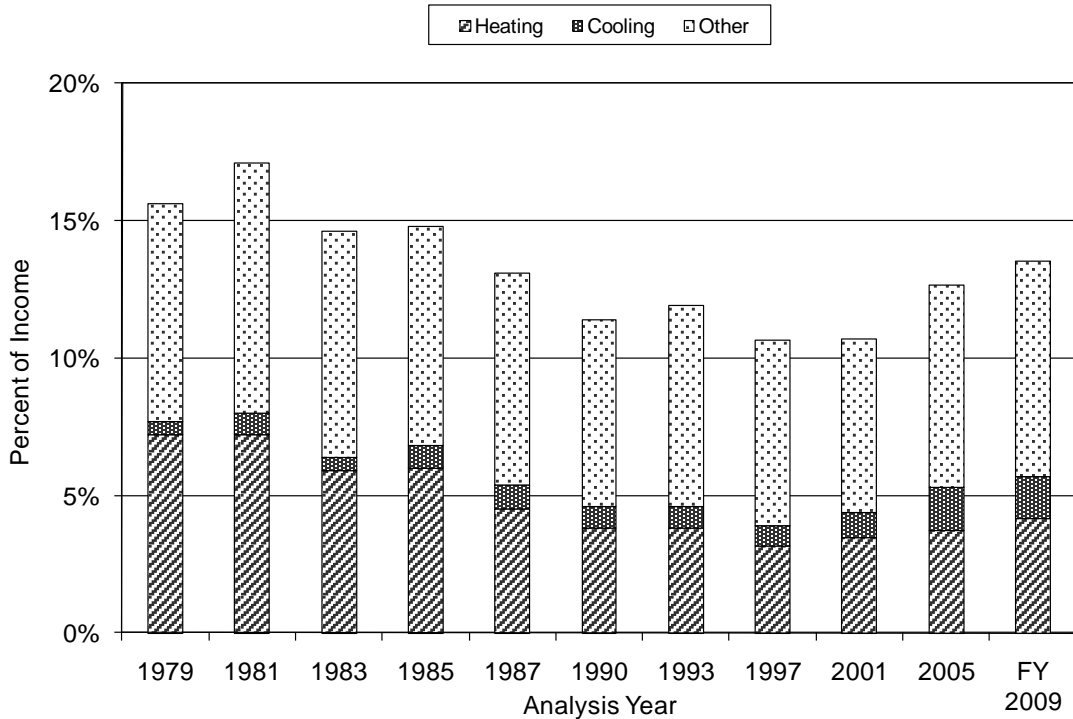
Figure 7. Mean residential energy expenditures for low income households, 1979 to FY 2009



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 5.6 percent in FY 2009; this represented a decline of 2.1 percentage points.⁷ The decline in mean group residential energy burden from 1979 to FY 2009 was 2.1 percentage points (from 15.6 percent to 13.5 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).

⁷ 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 2009



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 2009, fuel prices increased again. FY 2009 fuel prices were 19 percent higher than 2005 fuel prices. The increases in fuel prices from 2005 through FY 2009 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 2009

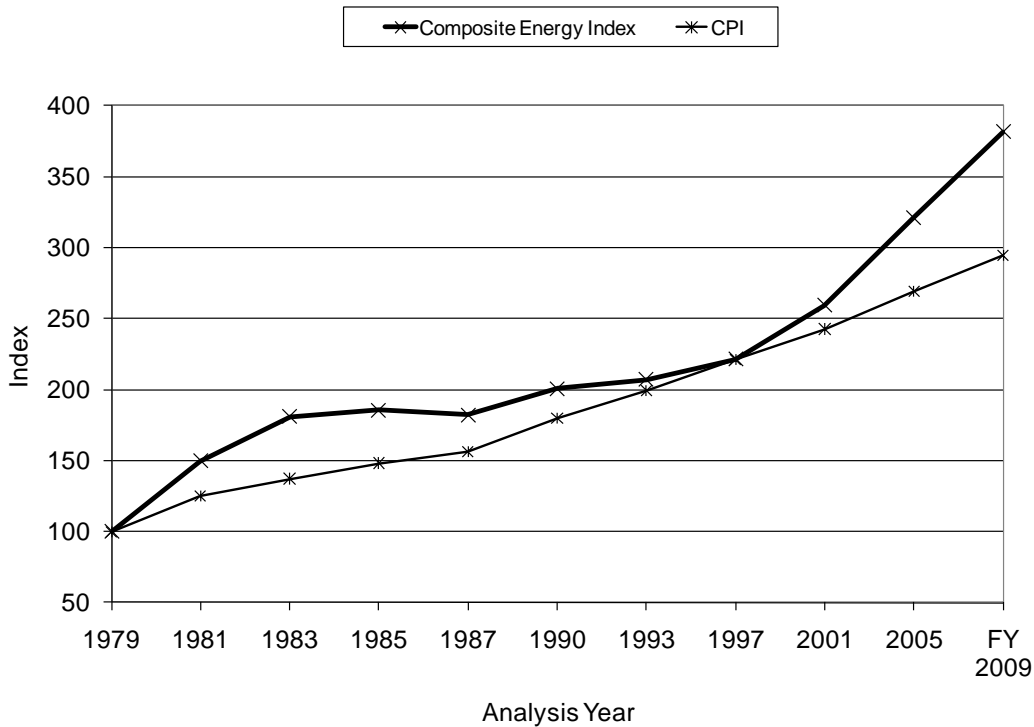
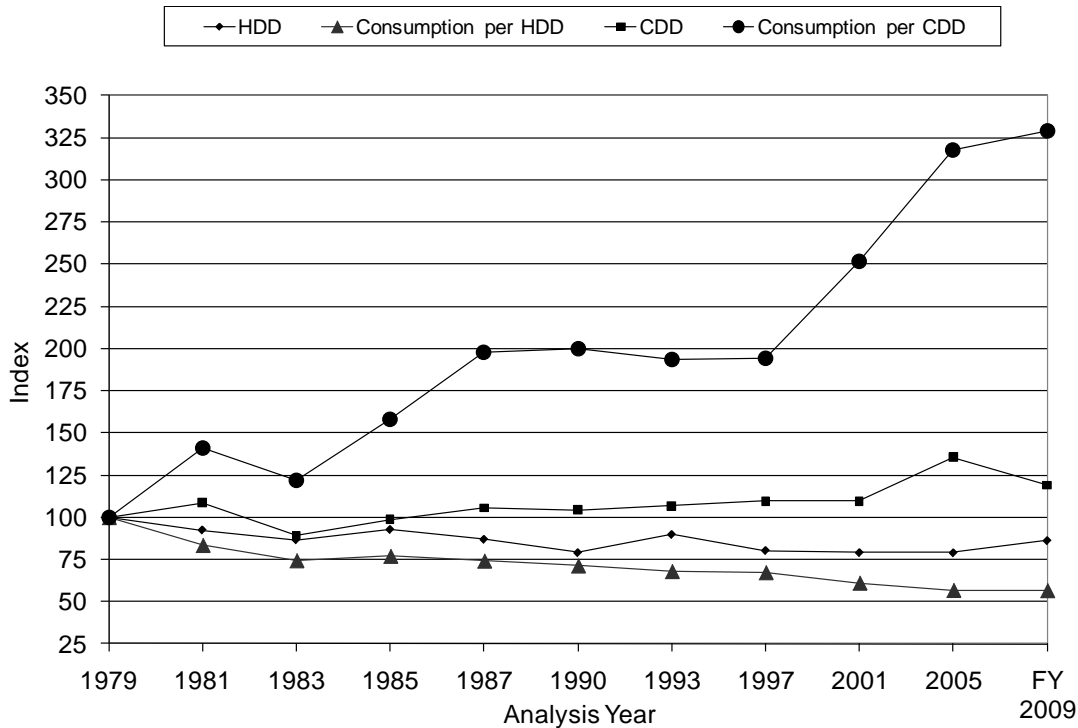


Figure 10 shows average energy consumption for heating and cooling compared to heating and cooling degree days from 1979 to FY 2009 for low income households. As shown, heating consumption per heating degree day generally declined from 1979 to FY 2009 probably at least in large part due to energy conservation efforts. In contrast, cooling consumption per cooling degree day rose sharply through FY 2009 because of a large increase in the availability of air-conditioning to low income households.⁸ Only 37 percent of low income households had air-conditioning equipment in 1979, but by 2005 the number had risen to 80 percent.

⁸Air-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 2009



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 2009, 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 5.7 percent, again over four times higher than that for all households.

Trends in LIHEAP

Between 1981 and FY 2009, as shown in Figure 11, the number of income eligible households has risen 129 percent, during which time Federal fuel assistance funds have increased by 156 percent.⁹ 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 2009 – though this figure has remained steady since 1997.¹⁰ 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 65 percent in FY 2009. 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 then increased by almost 74 percent in FY

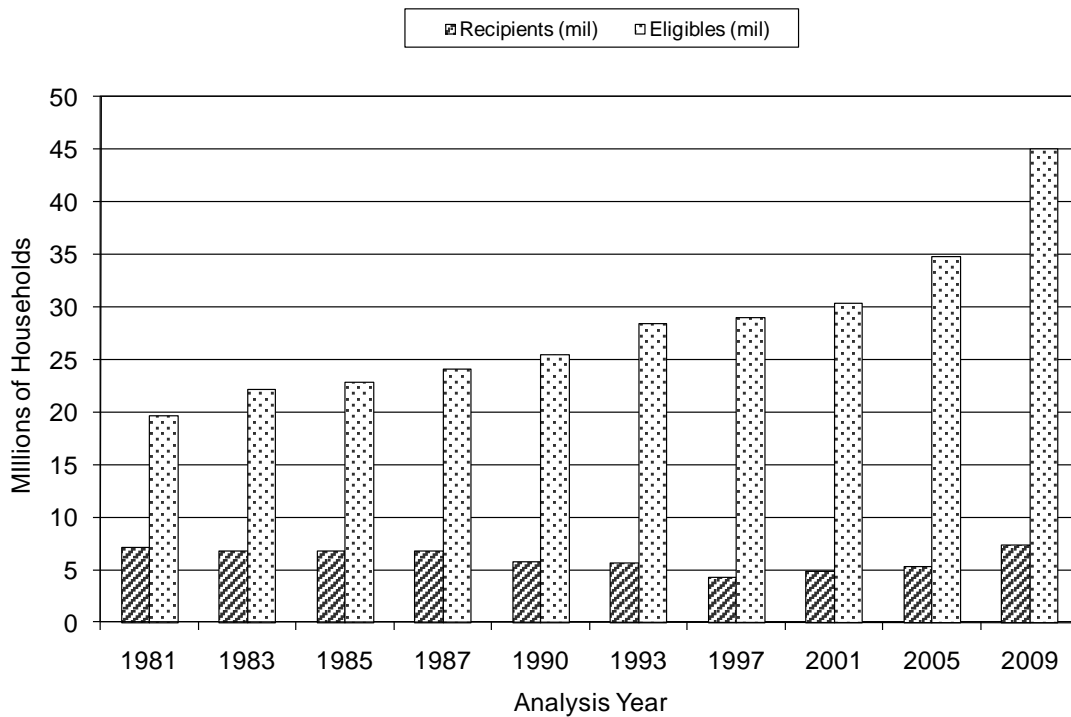
⁹ Income eligible household estimates do not include those households with incomes greater than the statutory income standards but who may still qualify for LIHEAP benefits because they are categorically eligible for LIHEAP under section 8624 (b)(2)(A) of the LIHEAP statute. The sharp increase in eligibility was due to a change in Federal maximum LIHEAP income standard in FY 2009. In FY 2009, Congress provided LIHEAP with \$5.1 billion in funding which is the highest level of funding the program has received.

¹⁰ 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.

2009. After adjusting for inflation, the mean value of combined Federal heating and winter crisis benefits fell (in 1981 dollars) from \$213 in 1981 to \$209 in FY 2009. Cooling benefits increased (in 1981 dollars) from \$129 in 1981 to \$142 in FY 2009.

The percentage of the total home heating bill for LIEAP/LIHEAP income eligible households covered by LIEAP/LIHEAP heating and winter crisis benefits decreased from 23 percent in 1981 to 14 percent in FY 2009. The decrease resulted from the combination of higher home heating bills, a slightly smaller per-household amount of assistance benefits, and a rise in the size of income eligible population.

Figure 11. Number of LIEAP/LIHEAP income eligible and heating and/or winter crisis assistance recipient households, FY 1981 to FY 2009



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 2009, 16 percent of federally income eligible households received assistance with their heating costs.¹¹ 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.

¹¹ For FY 2009, 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.¹²
- 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.¹³

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 2009 Annual Performance Report* furnished measurements of targeting performance. The performance report showed the LIHEAP targets and performance results for FY 2009.

SIPP study of energy affordability

OCS commissioned a study to analyze energy affordability problems for low income households using the Census Bureau's Survey of Income and Program Participation (SIPP) 2005 data and to compare the SIPP findings with those of the Energy Information Administration's 2005 Residential Energy Consumption Survey (RECS) to assess the consistency of the findings between the two surveys. This section of the Executive Summary presents information on this study.

Study goals

The LIHEAP Special Study of Energy Insecurity using the 2005 RECS furnished extensive information on the types and levels of Energy Insecurity that low income households face.¹⁴ This study is a follow-up to the 2005 RECS study to assess the consistency of the findings between the 2005 RECS and the SIPP and perform additional analyses using the SIPP to furnish information on the energy affordability problems of low income households.

The study had four objectives:

¹² *LIHEAP Targeting Performance Measurement Statistics: GPRA Validation of Estimation Procedures*, August 2004, Report prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.

¹³ *LIHEAP Energy Burden Evaluation Study*, March 2005, Report prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.

¹⁴ *LIHEAP Energy Insecurity Study included in the Office of Community Services' LIHEAP Home Energy Notebook for Fiscal Year 2008*, May 2010, prepared by APPRISE Incorporated under contract #DE-AM01-04EI41006.

- Level and Type – Computation of the rate of bill payment problems and energy service disconnections from the SIPP and comparison of the findings from the SIPP to those from the RECS for the same population to assess the consistency of the findings between the two surveys.
- Geographic and Demographic – Computation of the geographic and demographic dimensions of bill payment problems and energy service disconnections from the SIPP and comparison of the findings from the SIPP to those from the RECS for the same population to assess the consistency of the findings between the two surveys.
- Special Analysis of Income Dynamics and Assets– An analysis of income dynamics and household assets for elderly and non-elderly low income households to investigate the extent to which the differences between elderly and non-elderly households can be explained by income dynamics and assets.
- Special Analysis of Income Groups – An analysis of bill payment problems and energy service disconnections for households with income between 60 percent and 100 percent of State median income.

Level and type of energy affordability problems

The SIPP is a longitudinal survey that collects information on topics such as poverty, income, employment, and health insurance coverage. The 2004 SIPP Panel *Adult Well-Being Module*, which was administered in 2005, contained questions on energy affordability problems. Information collected included whether the household had trouble paying energy bills, whether the energy service was shut off, and the source of help received for paying bills and/or turning the service back on. These questions are administered to the entire body of the respondents.

The 2005 RECS included a detailed set of questions that documented the different types of energy affordability problems that low income households face. These questions were administered only to the respondents that were deemed to be LIHEAP income eligible under the Federal maximum LIHEAP income guidelines.

Table 1 furnishes information on the incidence of energy bill payment problems and service disconnections for low income households from the SIPP and RECS.¹⁵ The SIPP indicates a smaller incidence of energy bill payment problems and service disconnections for low income households. While the SIPP shows that about 19.5% of low income households had problems paying their bills, the RECS shows that 26.3% of those households did that. Moreover, according to the SIPP, about 3.5% of low income households had their service disconnected, compared to 5.0% according to the RECS.

¹⁵ Unless otherwise indicated and from this point of the Executive Summary forward, “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).

Table 1. Energy Affordability Problems for Low Income Households, SIPP vs. RECS, 2005

	RECS		SIPP	
	Number	Percent	Number	Percent
Bill Payment Problems	9,458,504	26.3%	6,018,547	19.5%
Service Disconnections	1,810,016	5.0%	1,071,140	3.5%
All Households	35,945,337	100%	30,876,500	100%

SOURCE: 2005 RECS and 2004 SIPP Panel

These findings suggest that there are some important differences between the RECS and the SIPP figures, which raise some concerns about the accuracy of the findings from both surveys. For example, even though the RECS indicates a higher incidence of energy service disconnections, the RECS figure is an underestimate of the total incidence of energy service shutoffs because the figure ignores service disconnections during the periods when heat or cooling is not needed.

Geographic and demographic dimensions of energy affordability problems

The Special Study of the 2005 RECS found some significant differences in the incidence of financial Energy Insecurity among different Census regions, income groups, and vulnerability groups. This section of the report presents tabulations of the SIPP and RECS data that furnish information on household energy affordability problems for the following dimensions:

- Geography – National and Census Region
- Percentage of HHS Poverty Guidelines– At or above 100% of HHS Poverty Guidelines, Above 100% of such guidelines but at or below 150% of such guidelines, Above 150% of such guidelines but at or below the Federal maximum LIHEAP income standard
- Vulnerability – Elderly Households, Young Child Households, Other Households

The study found that while there are some similarities in the findings from the RECS and the SIPP, there are also some important differences in the incidence of energy bill payment problems and energy service disconnections between the geographic and demographic subgroups that the study looked at.

Similarities include:

- Census Region – Low income households in the South Census region are more likely to experience bill payment problems and service disconnections than those in other Census regions.
- Poverty Level – Households with income at or below 100% of HHS Poverty Guidelines are more likely to experience energy affordability problems than households with income above 100% of HHS Poverty Guidelines.
- Vulnerability Group – Low income elderly households are significantly less likely to experience energy affordability problems than other types of low income households.

Differences include:

- SIPP shows a lower incidence of bill payment problems and energy service disconnections for low income households for every subgroup that the study looked at as well as for the whole population. Other differences include:
- Census Region – The SIPP shows smaller regional differences in energy affordability problems than the RECS.
- Poverty Level – The difference in the incidence of bill payment problems between the households with income at or below 100% HHS Poverty Guidelines and the households with income above 100% of HHS Poverty Guidelines is more pronounced in the SIPP than the RECS.

There are important caveats in comparison of the SIPP and RECS findings. The caveats include, but are not limited to, the following:

- Focus of Surveys – The SIPP is a survey of income and program participation. Since the main focus of SIPP is income, it is likely that SIPP provides more accurate income information than the RECS. On the other hand, the main focus of RECS is energy, so the RECS is more likely to provide more accurate information on the energy affordability problems.
- Survey Questions – The wording of survey questions are different in the two surveys. This makes it hard to make exact comparisons.
- Reference Period – Although both surveys were conducted in 2005 and asked about the incidence of energy affordability problems in the past 12 months, there are difference in the time of the year that the surveys were conducted.

Further research is needed to understand to what extent the above factors were responsible for the difference in findings with respect to the incidence of energy affordability problems for low income households between the two surveys.

Analysis of income dynamics and assets for elderly households

The tabulations of both the 2005 SIPP and 2005 RECS data showed that elderly low income households were less likely to experience energy affordability problems than other types of low income households. This study hypothesized that households with greater amounts of assets and/or households with non-volatile monthly income would be less likely to experience energy affordability problems than households with less amounts of assets and/or households with volatile monthly income, and that income dynamics and assets could explain some of the observed difference between elderly and non-elderly households.

The study used multiple regression models to investigate the extent to which the differences between elderly and non-elderly low income households could be explained by household assets and income dynamics. The multivariate analysis shows that, after controlling for Census region, household poverty level, and State fixed effects¹⁶, elderly low income households experience significantly lower rates of energy bill payment problems and service disconnections. When household net worth is

¹⁶ State fixed effects are controlled for by adding State indicator variables to the regression model. State fixed effects can be interpreted as any unmeasured characteristic of a given State that leads the State to have a particular level of bill payment issues and/or service disconnections that does not vary over time. These indicator variables capture fixed differences in bill payment issues and/or service disconnections across States.

added to the regression model, the effect of being elderly on the likelihood of having energy bill payment problems and service disconnections decreases only slightly, and remains statistically significant.

For the purpose of the study, a household is considered to have volatile income if, in the last twelve months, the maximum difference in income between any two months is greater than 50 percent or a household has zero income in one month and non-zero income in another month.

An indicator variable for having volatile income is added to the multiple regression model that includes census region indicators, household poverty level, household net worth, and State indicator variables. The findings from the regression analysis show that, controlling for other explanatory factors, households with volatile income are more likely to have bill payment problems. However, having volatile income does not have a statistically significant effect on the likelihood of service disconnections. Moreover, when a volatile income indicator is added to the regression model, the effect of being elderly on the likelihood of having energy bill payment problems decreases further but only slightly, and continues to be statistically significant.

The multivariate analysis findings on elderly households indicate that while income dynamics and household net worth explain some of the difference between elderly and non-elderly households, there is still some significant difference that is left unexplained by the variables included in the model. There might be some other observable and unobservable factors that could explain the difference between elderly and non-elderly households.

It is important to note that the variables included in the regression model explain the variation in bill payment problems better than the variation in the service disconnections. This may be due to the fact the States and utilities may have different rules and regulations related to service disconnections and household financial characteristics may not be the factor that determines whether the households receives a service shutoff if it has bill payment problems.

Analysis of energy affordability problems by income group

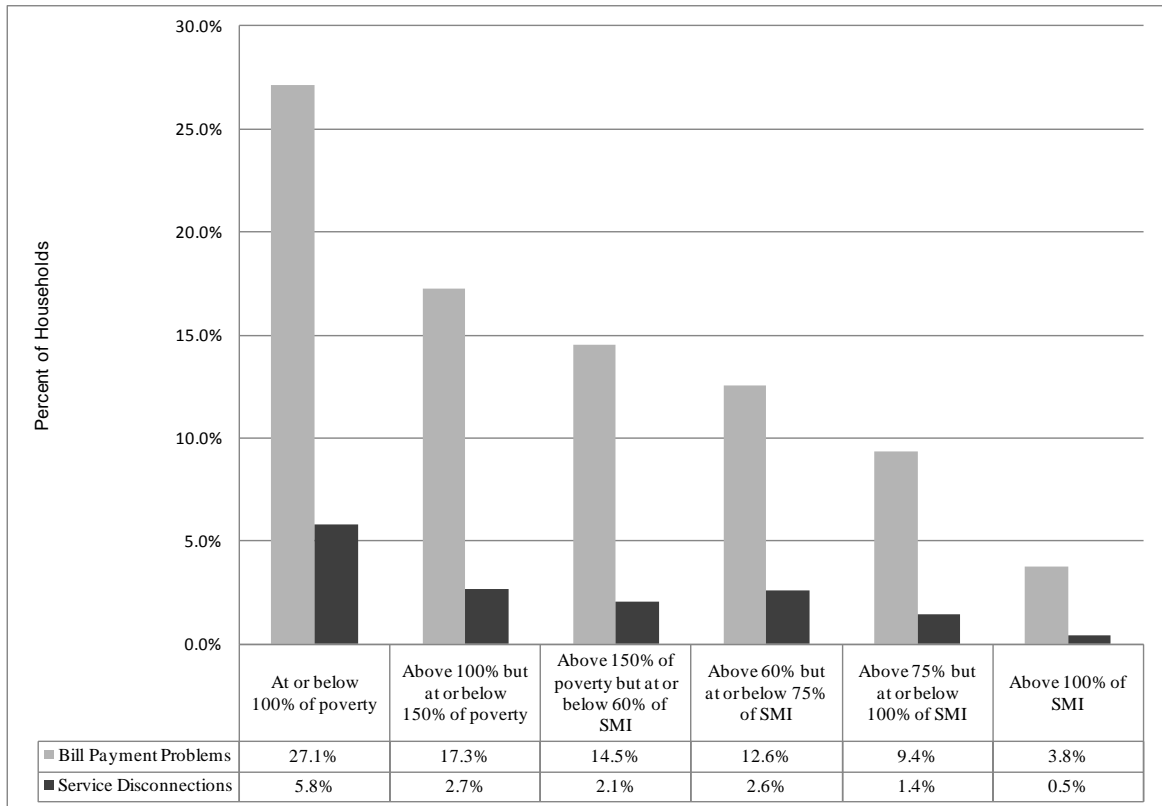
For fiscal year 2009, the Congress raised the Federal maximum LIHEAP income standard to the greater of 75% State median income or 150% of HHS Poverty Guidelines from the greater of 60% State median income or 150% of HHS Poverty Guidelines. The 2005 RECS Energy Insecurity questions, funded by OCS, were administered only to the respondents that were income eligible for LIHEAP according to the Federal maximum LIHEAP income standard in 2005. Therefore, the 2005 RECS Energy Insecurity questions cannot provide information on households that are newly made income eligible for LIHEAP by the change in the law.

The SIPP adult well-being questions, on the other hand, were administered to all survey respondents. Therefore, SIPP can provide information on energy affordability problems for those newly income eligible households and for households that have income above 75% State median income but at or below 100% of State median income. The information on the latter group of households is of particular interest to OCS, as OCS recently funded a series of Energy Insecurity questions in the 2009 RECS to be administered to a subsample of RECS households with income at or below 100% State median income.

Using the SIPP data, the study analyzed the bill payment problems and energy service disruptions for those households with income above the old Federal maximum LIHEAP income standard but at or below 75% of State median income, and those with income above 75% of State median income but at or below 100% of State median income.

Figure 12 shows the percentage of households having bill payment problems and service disconnections by income group. It is clear from the figure that as the household income increases, the likelihood of having bill payment problems decreases. For example, while 27.1% of the households with income at or below HHS Poverty Guidelines (“poverty”) reported having bill payment problems, only about 3.8% of households with income above the State median income reported so. Similarly, the higher the household income, the lower is the incidence of service disconnections. However, it is interesting to note that households with income above the Federal income standard but at or below 75% of the State median income experienced a slightly higher rate of service disconnections (2.6%) than households with income above 150% of poverty but at or below the 60% of the State median income (2.1%). This may be due to the fact the former group of households was not, under the Federal maximum LIHEAP income standard, income eligible for LIHEAP at the time of the SIPP survey but the latter group was.

Figure 12. Energy Affordability Problems by Income Group, SIPP, 2005



SOURCE: 2004 SIPP Panel

Study implications

The study answers many of the following important questions posed by OCS at the beginning of the study regarding the energy affordability problems for low income households:

Question #1 – Are the SIPP and RECS findings consistent for the level and type of energy affordability problems among low income households?

Answer – No. The study found that while there are some similarities in the findings from the RECS and the SIPP, there are also some important differences in the incidence of energy bill payment problems and energy service disconnections between the geographic and demographic subgroups that the study looked at. One major difference between the SIPP and RECS findings is

that SIPP not only shows a lower overall incidence of bill payment problems and energy service disconnections for low income households but also a consistently lower incidence of such problems for every subgroup that the study analyzed.

Question #2 – *Are the SIPP and RECS findings consistent for the rate of energy affordability problems for elderly vs. non-elderly households?*

Answer – Yes. The tabulations of both the 2005 SIPP and 2005 RECS data showed that elderly low income households were less likely to experience energy affordability problems than other types of low income households.

Question #3 – *Are low income households with net worth and/or stable income less likely to experience energy affordability problems?*

Answer – Yes. The data tabulations from the SIPP showed that households with higher net worth and/or more stable income were less likely to have energy affordability problems.

Question #4 – *Do elderly low income households have more net worth and/or more stable income than other types of households?*

Answer – Yes. The data tabulations from the SIPP indicated that elderly households had more net worth and more stable monthly income than non-elderly households.

Question #5 – *Do income dynamics and household net worth explain the differences between elderly and non-elderly households?*

Answer – No. The multivariate analysis of income dynamics and household net worth showed that while income dynamics and household net worth explain some of the difference between elderly and non-elderly households, there is still some significant difference that is left unexplained by the variables included in the model. There might be some other observable and/or unobservable factors that could explain the difference between elderly and non-elderly households. Further research is needed to identify such factors.

Question #6 – *What is the incidence of energy affordability problems for the group of households that are made income-eligible for LIHEAP by the increase of Federal maximum LIHEAP Income standard for FY 2009?*

Answer – According to the SIPP, there are an additional 10.6 million households that are made income eligible for LIHEAP, under the Federal maximum LIHEAP income standard, by the increase in the Federal maximum LIHEAP income standard for FY 2009. There are about 1.3 million households with income above 60% but at or below 75% of State median income that had bill payment problems. Nearly 250 thousand such households experienced a service disconnection.

The analysis of the SIPP data confirmed that elderly low income households are less likely to have bill payment problems and/or experience service disconnections than non-elderly low income households. The differences between elderly and non-elderly households could not explained by differences in household net worth or income stability.

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 2009 home energy data presented in this *Notebook* were derived from existing data sources and analytic procedures. These include the following:

- For household-level data on home energy: the national Residential Energy Consumption Surveys (RECS) for 2005, 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--Federal Fiscal Year 2009* and the *LIHEAP Grantee Survey for Federal Fiscal Year (FFY) 2009*.

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 2009. 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 2009. 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 – SIPP study of energy affordability. This section presents the results of the special study commissioned by OCS to analyze energy affordability problems for low income households using the Census Bureau's 2005 Survey of Income and Program Participation (SIPP) data and to compare the SIPP findings with those of the Energy Information Administration's 2005 Residential Energy Consumption Survey (RECS) to assess the consistency of the findings between the two surveys.
- Appendix A documents the procedures used to prepare the FY 2009 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 2009 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.^{17,18} In FY 2009, average residential energy consumption for all households was 97.8 million British Thermal Units (mmBTUs) and average expenditures were \$2,180. The mean individual residential energy burden for all households was 7.2 percent of income.

Low income households had average residential energy consumption of 86.5 mmBTUs (11.6 percent less than all households) and average energy expenditures of \$1,885 (13.5 percent less than all households). Their mean individual residential energy burden was 13.8 percent, nearly twice that for all households and nearly four times that for non low income households.

Average residential energy expenditures for LIHEAP recipient households were \$2,087, almost 10 percent higher than that for all low income households. The mean individual residential energy burden was 16.4 percent, 2.6 percentage points higher than that for low income households.

Nationally, average residential energy expenditures for all households and for low income households stayed about the same in FY 2009 as in FY 2008. LIHEAP recipient households decreased theirs by only one percent, from \$2,104 in FY 2008 to \$2,087 in FY 2009. While average expenditures for households heating with natural gas and electricity increased from FY 2008 to FY 2009 due to a rise in prices for these fuels, they decreased for households heating with fuel oil, kerosene, or LPG due to a decline in prices for such fuels.

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

¹⁷Comparisons 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.

¹⁸For fiscal year 2009, the Congress raised the Federal maximum LIHEAP income standard to the greater of 75% State median income or 150% of HHS Poverty Guidelines from the greater of 60% State median income or 150% of HHS Poverty Guidelines. To maintain comparability with the previous *Notebooks*, low income definition was kept the same as before.

and home cooling expenditures. In FY 2009, home heating was 32 percent of the residential energy bill for low income households, and home cooling made up 11 percent.

LIHEAP Home Energy Notebook for FY 2009: 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 2009^{1/} (See also Tables A-3a – A-3c, Appendix A)

Main heating fuel	Fuel consumption (mmBTUs) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
<i>All households</i>					
All fuels	97.8	\$2,180	7.2%	4.4%	3.2%
Natural gas	114.0	\$2,148	6.4%	4.0%	3.1%
Electricity	61.1	\$1,868	7.1%	4.1%	2.7%
Fuel oil	152.7	\$3,496	12.2%	7.3%	5.1%
Kerosene	55.1	\$1,521	9.8%	7.0%	2.2%
LPG ^{6/}	110.6	\$2,945	9.7%	6.6%	4.3%
<i>Non low income households</i>					
All fuels	103.8	\$2,339	3.6%	3.1%	2.6%
Natural gas	118.5	\$2,303	3.5%	3.0%	2.6%
Electricity	65.8	\$2,013	3.3%	3.0%	2.2%
Fuel oil	161.8	\$3,757	5.5%	4.9%	4.2%
Kerosene	62.2*	\$1,549*	4.3%	4.8%	1.7%
LPG ^{6/}	118.1	\$3,058	5.2%	4.7%	3.4%
<i>Low income households</i>					
All fuels	86.5	\$1,885	13.8%	9.6%	10.4%
Natural gas	104.5	\$1,822	12.5%	9.0%	10.0%
Electricity	53	\$1,623	13.4%	8.4%	8.9%
Fuel oil	138.8	\$3,096	22.4%	16.0%	17.0%
Kerosene	53.8	\$1,515	10.8%	8.8%	8.3%
LPG ^{6/}	96.3	\$2,731	18.2%	14.5%	15.0%
<i>LIHEAP recipient households</i>					
All fuels	106.7	\$2,087	16.4%	10.8%	13.4%
Natural gas	117.2	\$1,961	15.0%	10.6%	12.6%
Electricity	49.4	\$1,337	15.2%	9.4%	8.6%
Fuel oil	157.1	\$3,532	24.9%	24.1%	22.7%
Kerosene	78.3*	\$1,758*	18.9%	14.1%	11.3%
LPG ^{6/}	109.1	\$3,298	17.9%	11.2%	21.2%

^{1/}Data are derived from the 2005 RECS, adjusted to reflect FY 2009 heating degree days, cooling degree days, and fuel prices. Data represent residential energy used from October 2008 through September 2009.

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

^{3/}Mean individual burden is calculated by taking the mean, or average, of individual energy burdens, as calculated from FY 2009 adjusted RECS data. See Appendix A for information on calculation of energy burden.

^{4/}Median individual burden is calculated by taking the median of individual energy burdens, as calculated from FY 2009 adjusted RECS data.

^{5/}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 2009; and (3) dividing the adjusted figures by the average income for each group of households from the 2009 CPS ASEC.

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

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

Residential energy expenditures of low income households are distributed in roughly the same way as those of all households. However, LIHEAP recipients spent a higher proportion of their annual residential expenditures for space heating and a lower proportion for space cooling than did other groups. LIHEAP recipient households spent 39 percent of their annual residential expenditures for space heating, 7 percentage points more than did the average low income household. LIHEAP recipient households spent 6 percent for space cooling, about 55 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 2009

End Use	All households	Non low income households	Low income households	LIHEAP recipient households
Space heating	29%	28%	32%	39%
Space cooling	12%	12%	10%	6%
Water heating	15%	15%	16%	16%
Refrigeration	8%	8%	8%	7%
Appliances	36%	37%	34%	32%
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 of all fuels, 31.8 percent, and LIHEAP recipient households used electricity at the lowest rate of all fuels, 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^{1/} (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 ^{2/}	3.2%	2.9%	3.7%	1.2%

^{1/}Data are derived from the 2005 RECS. Percentages may not add to 100 percent due to rounding.

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

Non low income households increased their use of electricity for home heating from 24.1 percent of households in September 1990 to 29.2 percent in April 2005.¹⁹ 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 2009, average home heating consumption for all households was 41.7 mmBTUs, average expenditures were \$631, and mean individual home heating burden was 2.3 percent.

Low income households had average home heating consumption of 39.7 mmBTUs (4.8 percent less than the average for all households) and average home heating expenditures of \$600 (4.9 percent less than the average for all households). The mean individual home heating burden for low income households was 4.7 percent, more than 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 57.1 mmBTUs (37 percent higher than the average for all households), and average home heating expenditures were \$816 (about 29 percent higher than the average for all households). Mean individual home heating burden for LIHEAP households was 6.9 percent, 2.2 percentage points higher than the average for low income households and three times the average for all households. Average home heating consumption for LIHEAP recipient households was 44 percent greater than that for all low income households, because LIHEAP heating assistance recipient households tend to live in colder climate regions.²⁰

For FY 2009, the heating season was colder than the FY 2008 heating season. Between FY 2008 and FY 2009, home heating consumption increased by 5.3 percent for all households, 5.9 percent for low income households, and 6.3 percent for LIHEAP recipient households.

Compared to FY 2008, the FY 2009 prices for natural gas increased by 3.0 percent and electricity prices increased by 3.8 percent, while fuel oil/kerosene prices decreased by 21.9 percent and LPG prices decreased by 17.9 percent in nominal terms.²¹ Average home heating expenditures for all households, low income households, and LIHEAP recipient households heating with electricity or natural gas increased as a result of rises in fuel prices and an increase in consumption due to a colder heating season during this period. However, the expenditures for households heating with fuel oil, kerosene, or LPG have declined because the decline in fuel prices more than offset the rise in consumption to a colder heating season.

The change in home heating expenditures from FY 2008 to FY 2009 varied considerably across the three major home heating fuels. Expenditures for households heating with natural gas increased by 8 percent. Expenditures for households heating with electricity increased by almost 11 percent, while expenditures for households heating with fuel oil decreased by almost 23 percent.

¹⁹Findings from the 2005 RECS, Energy Information Administration, U.S. Department of Energy.

²⁰LIHEAP Home Energy Notebook for FY 2006.

²¹Price data obtained from the Energy Information Administration's Monthly Energy Review, September 2010, for all fuels.

LIHEAP Home Energy Notebook for FY 2009: II. Home Energy Data

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 2009^{1/} (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)

Main heating fuel	Fuel consumption (mmBTUs) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
<i>All households</i>					
All fuels	41.7	\$631	2.3%	1.0%	0.9%
Natural gas	54.0	\$648	2.3%	1.1%	0.9%
Electricity	9.0	\$284	1.2%	0.6%	0.4%
Fuel oil	102.9	\$1,804	7.3%	3.7%	2.6%
Kerosene	21.8	\$377	2.2%	1.7%	0.6%
LPG ^{6/}	55.0	\$1,289	4.3%	2.6%	1.9%
<i>Non low income households</i>					
All fuels	42.8	\$648	1.1%	0.6%	0.7%
Natural gas	53.4	\$646	1.0%	0.8%	0.7%
Electricity	9.6	\$299	0.5%	0.4%	0.3%
Fuel oil	106.6	\$1,875	2.9%	2.4%	2.1%
Kerosene	26.8*	\$447*	1.4%	0.9%	0.5%
LPG ^{6/}	61.0	\$1,382	2.4%	2.0%	1.5%
<i>Low income households</i>					
All fuels	39.7	\$600	4.7%	2.3%	3.3%
Natural gas	55.4	\$653	4.9%	3.0%	3.6%
Electricity	8.1	\$257	2.2%	1.2%	1.4%
Fuel oil	97.2	\$1,695	14.1%	9.0%	9.3%
Kerosene	20.9	\$364	2.4%	1.7%	2.0%
LPG ^{6/}	43.7	\$1,114	8.0%	6.4%	6.1%
<i>LIHEAP recipient households</i>					
All fuels	57.1	\$816	6.9%	3.6%	5.2%
Natural gas	66.3	\$785	6.9%	3.7%	5.0%
Electricity	9.2	\$275	3.8%	1.6%	1.8%
Fuel oil	104.4	\$1,823	12.7%	10.2%	11.7%
Kerosene	26.2*	\$415*	4.2%	4.3%	2.7%
LPG ^{6/}	46.9	\$1,189	7.6%	4.2%	7.6%

^{1/}Data are derived from the 2005 RECS, adjusted to reflect FY 2009 heating degree days and fuel prices. Data represent home energy used from October 2008 through September 2009.

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

^{3/}Mean individual burden is calculated by taking the mean, or average, of individual heating energy burdens, as calculated from FY 2009 adjusted RECS data. See Appendix A for information on energy burden calculation.

^{4/}Median individual burden is calculated by taking the median of individual heating energy burdens, as calculated from FY 2009 adjusted RECS data.

^{5/}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 2009; and (3) dividing the adjusted figures by the average income for each group of households from the 2009 CPS ASEC.

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

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

Home cooling data

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

Cooling type

As shown in Table 2-5, about 92 percent of households in 2005 cooled their homes in ways recorded 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^{1/} (See also Table A-7, Appendix A)

Presence of Cooling	All Households	Non low income households	Low income households	LIHEAP recipient households
Cooling ^{2/}	92.1%	93.8%	88.6%	85.5%
None ^{3/}	7.9%	6.2%	11.4%	14.5%

^{1/}Data are derived from the 2005 RECS.

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

^{3/}Represents households that do not cool or cool in ways other than those recorded by the 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 2009, average home cooling consumption for households that cooled was 7.8 mmBTUs, average expenditures were \$276, and mean individual home cooling burden was 1.0 percent.

For households that cooled, low income households had average home cooling energy consumption of 6.3 mmBTUs (about 19 percent less than the average for all households) and average home cooling expenditures of \$223 (about 19 percent less than the average for all households). The mean individual home cooling burden for low income households was 2.0 percent, twice the average home cooling burden of all households and four times that of non low income households.

For households that cooled, average home cooling consumption for LIHEAP recipient households was 4.3 mmBTUs (about 45 percent less than all households), and average home cooling expenditures were \$151 (about 45 percent less than all households). Mean individual home cooling burden for LIHEAP recipient households was 1.1 percent, 10 percent higher than the average for all households. On average, LIHEAP recipient households consumed nearly 32 percent fewer BTUs for cooling than did all low income households.

The FY 2009 cooling season was cooler than FY 2008. From FY 2008 to FY 2009, home cooling consumption decreased by 9.3 percent for all households, by 8.7 percent for low income households, and by 10.4 percent for LIHEAP recipient households.

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

LIHEAP Home Energy Notebook for FY 2009: II. Home Energy Data

decreased by about 8 percent. The cooling expenditures decreased between FY 2008 and FY 2009 because the decline in cooling consumption as a result of a cooler cooling season more than offset the slight rise in the price for electricity.

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 2009^{1/} (See also Table A-7, Appendix A)

Household group	Fuel consumption (mmBTUs) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All households	7.8	\$276	1.0%	0.4%	0.4%
Non low income households	8.6	\$303	0.5%	0.2%	0.3%
Low income households	6.3	\$223	2.0%	0.7%	1.2%
LIHEAP recipient households	4.3	\$151	1.1%	0.4%	1.0%

^{1/}Data are derived from the 2005 RECS, adjusted to reflect FY 2009 cooling degree days and fuel prices. Data represent residential energy used from October 2008 through September 2009.

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

^{3/}Mean individual burden is calculated by taking the mean, or average, of individual cooling energy burdens, as calculated from FY 2009 adjusted RECS data. See Appendix A for information on energy burden calculation.

^{4/}Median individual burden is calculated by taking the median of individual cooling energy burdens, as calculated from FY 2009 adjusted RECS data.

^{5/} 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 2009; and (3) dividing the adjusted figures by the average income for each group of households from the 2009 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 2009 CPS ASEC, the definition based solely on 150 percent of HHS’ poverty guidelines excludes 11 million households of the 35 million households that meet the definition of LIHEAP income eligible households. Therefore, differences in FY 2009 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.”²² 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.

²²As 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.

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. ^{1/}
Energy end uses	The specific use of energy in the home for home heating, home cooling or ventilation, water heating, and appliances.
Fuel assistance	LIHEAP heating, cooling, and crisis assistance.
Heating degree days	Daily heating degree days are computed by subtracting the mean temperature for a day, when that temperature falls below 65 degrees Fahrenheit, from a base temperature (65 degrees Fahrenheit). For example, if the mean temperature on a day is 60 and the base temperature is 65, the number of heating degree days experienced on that day is 5 (65 minus 60). In this <i>Notebook</i> , we refer to annual heating degree days, or the sum of all heating degree days experienced during a year.
Home energy expenditures	Expenditures for home space heating and home space cooling 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.

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

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

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

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

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

Trends in 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 2005.²³ 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 2005.²⁴ 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.

²³For 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.

²⁴For 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

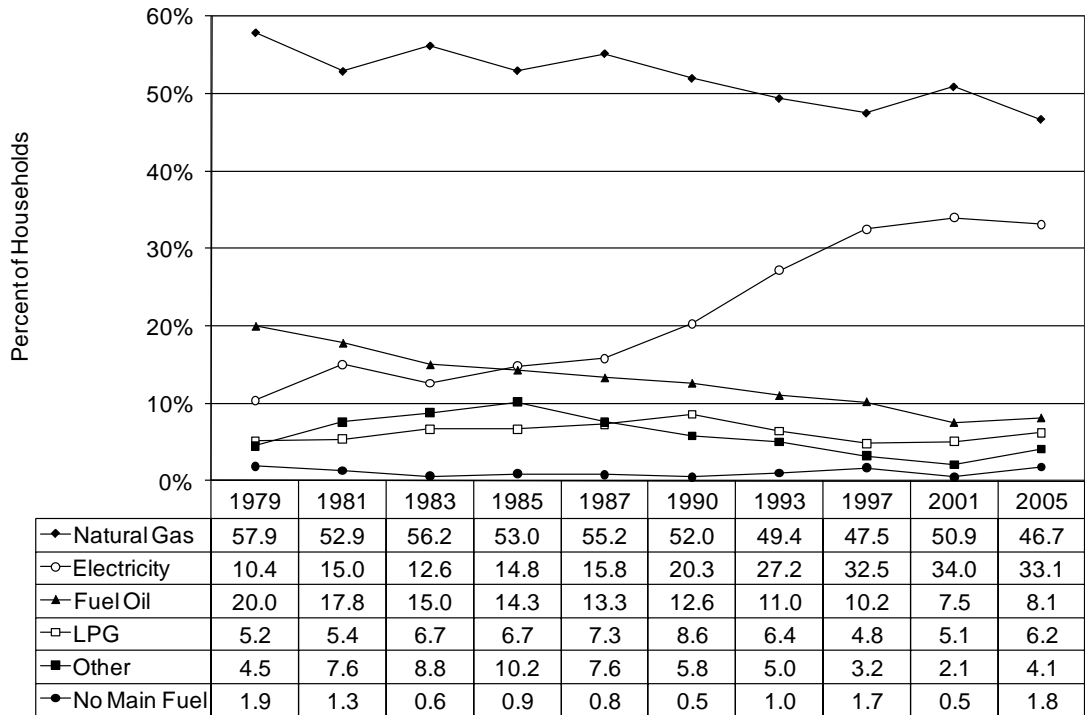
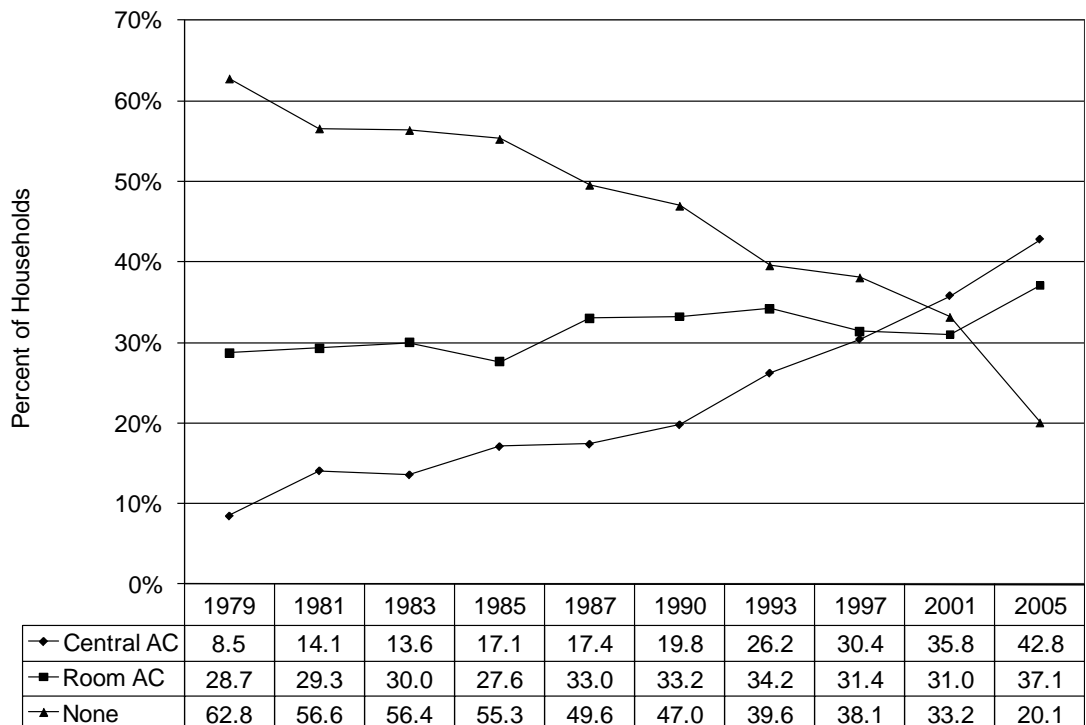


Figure 3-2. Air-conditioning type for households with incomes at or below 150 percent of HHS' poverty guidelines, 1979 to 2005



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 2009. 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.²⁵ 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 2009.

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 2009

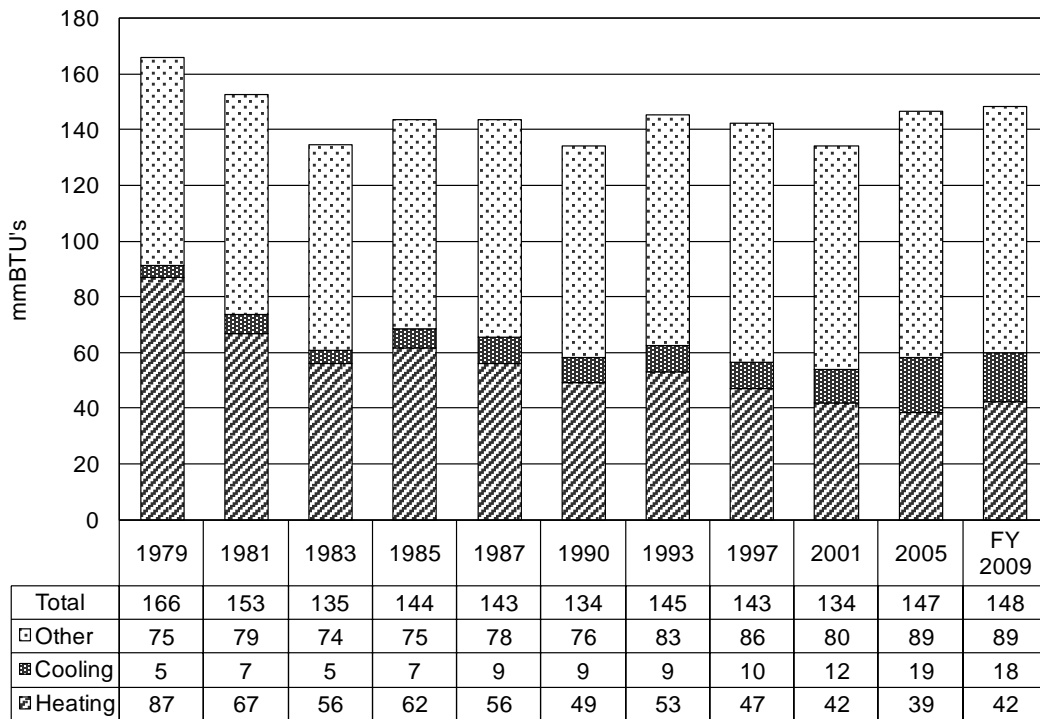
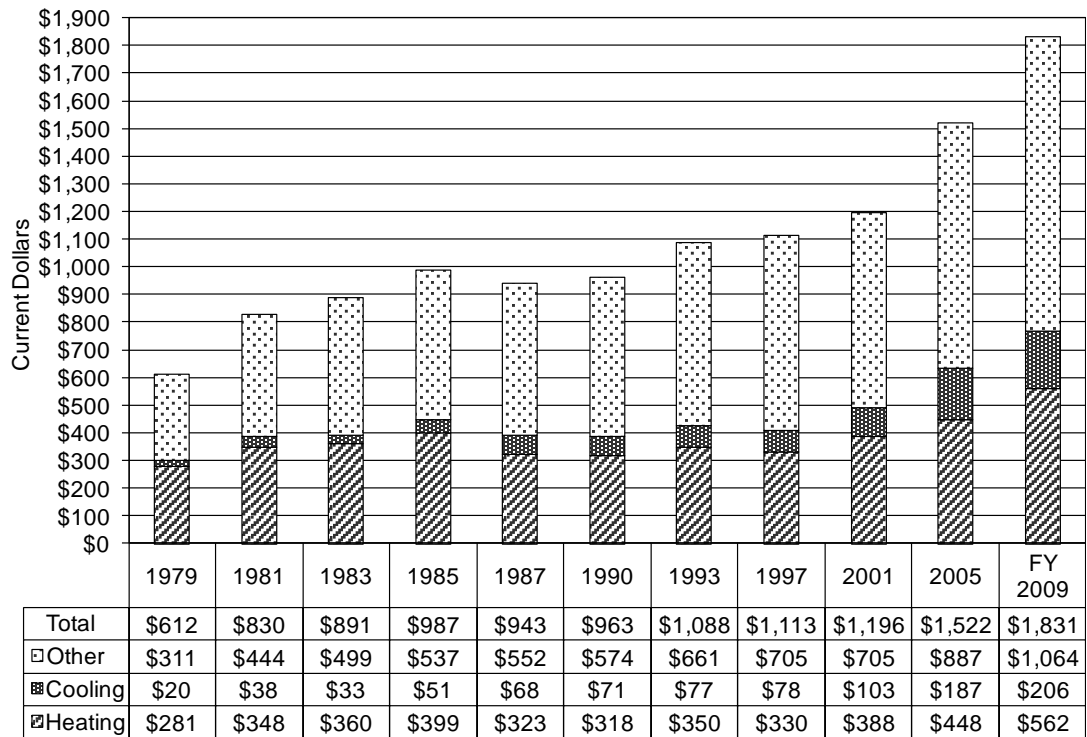


Figure 3-4, on the next page, shows that mean residential energy expenditures for low income households increased rapidly from 1979 to 1985; the increases were the result of fuel price increases. Examination of the components of energy expenditures indicates that the greatest increases were in home cooling 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 2009, 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

²⁵The 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.

1997, a 15 percent increase in 2005 over 2001, and a 25 percent increase in FY 2009 over 2005. The increase in expenditures in 2005 and FY 2009 were the result of higher fuel prices. Mean home cooling expenditures rose continuously from \$51 in 1985 to \$187 in 2005. In FY 2009 mean home cooling expenditures were \$206.

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 2009



The next series of Figures, 3-5 through 3-7, furnishes information on energy burden for low income households.²⁶ 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.²⁷ 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)

²⁶These 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.

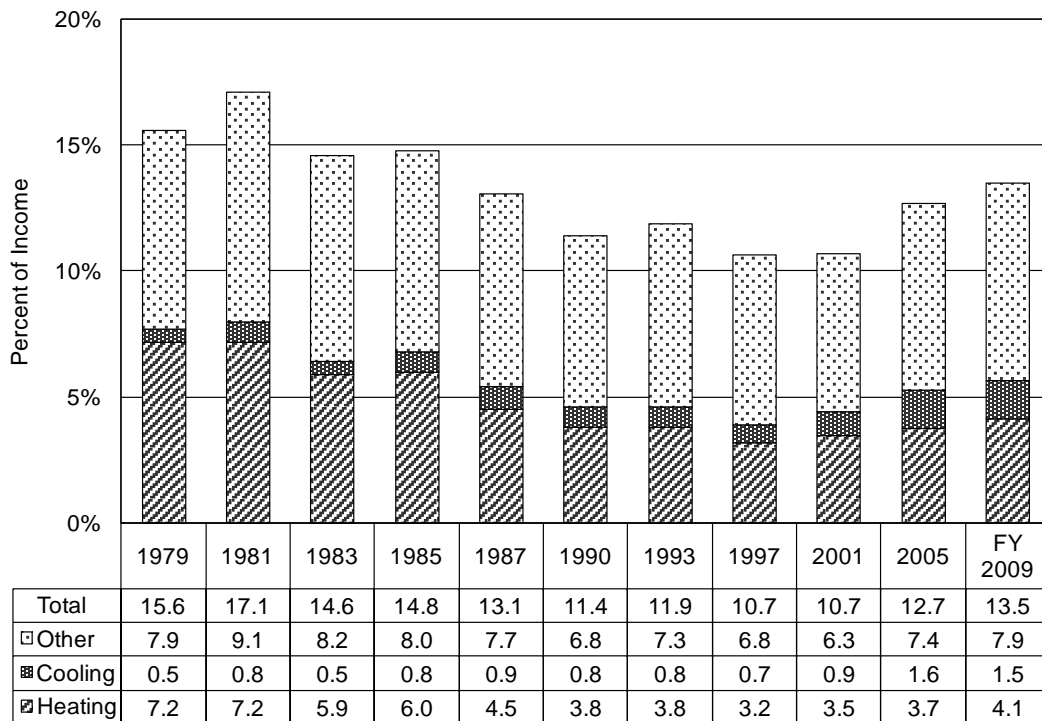
²⁷The mean is the sum of all values divided by the number of values, or what is commonly called the average. The median is the value at the midpoint in the distribution of values.

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.²⁸

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 2009, burden increased to 5.6 percent because expenditures rose. Home energy burden for FY 2009 was 27 percent higher than in 2001, nearly 6 percent higher than in 2005, but was 30 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 2009



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

²⁸ 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 2009, median individual residential energy burden was 28 percent lower, group mean burden was 21 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 2009

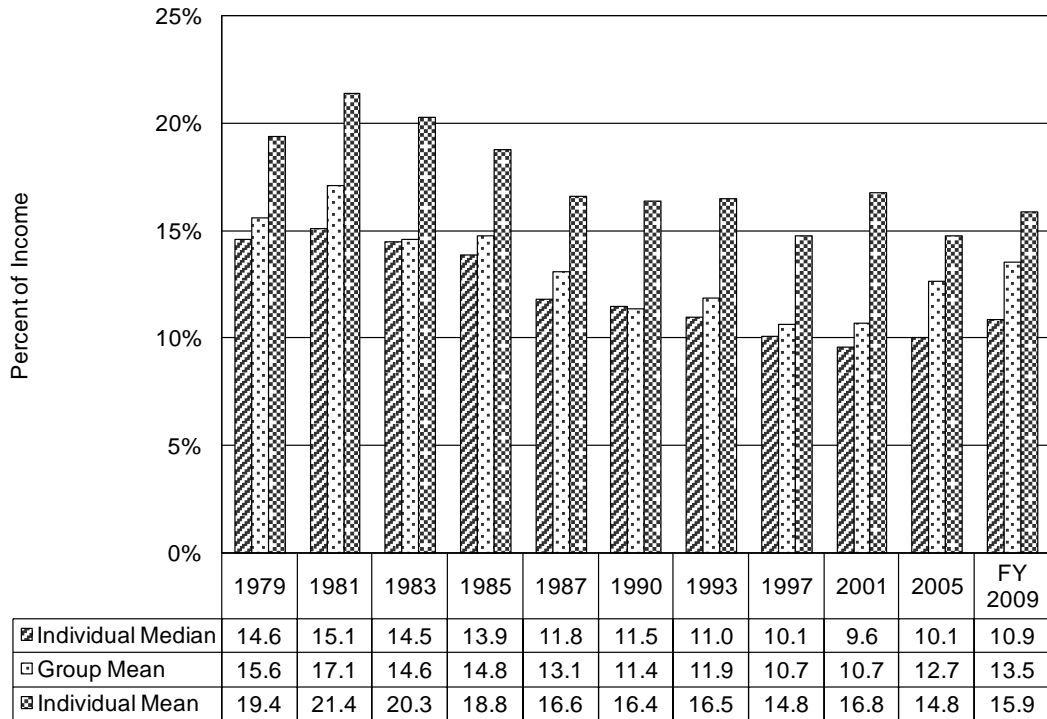
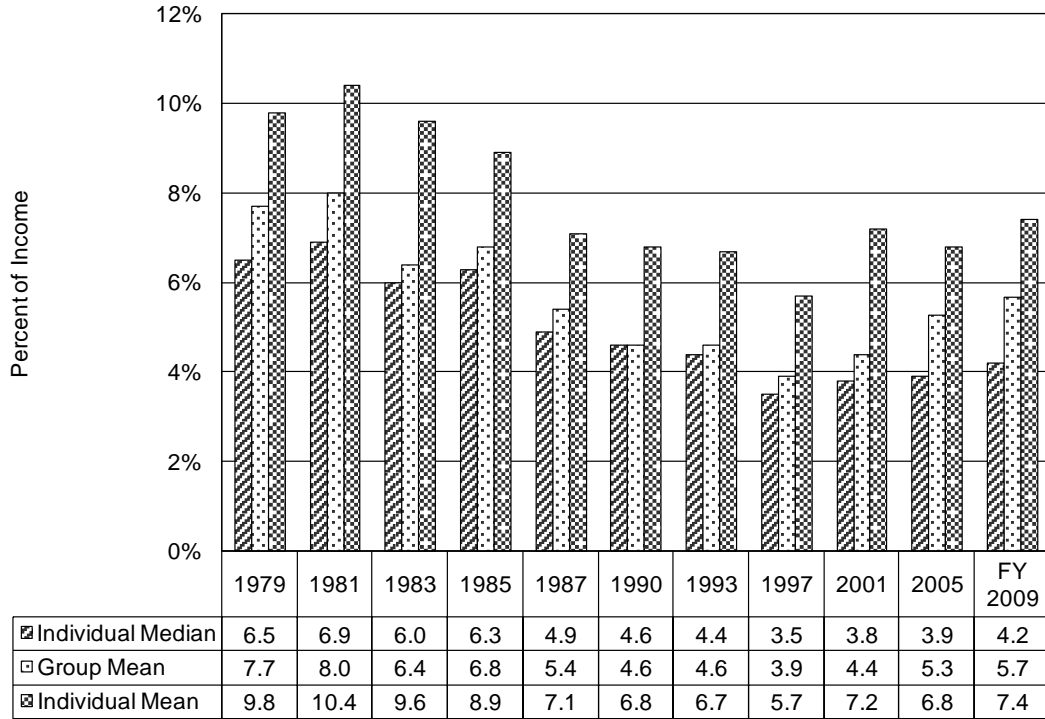


Figure 3-7. Comparison of mean group, mean individual, and median individual home energy burden for households with incomes at or below 150 percent of HHS' poverty guidelines, 1979 to FY 2009



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 2009, the percent of households exceeding the specified levels increased by at most 11 percent, while the number of households exceeding the specified levels increased by at least 30 percent. The number of low income households with home energy burdens exceeding 10 percent of income in FY 2009 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 2009

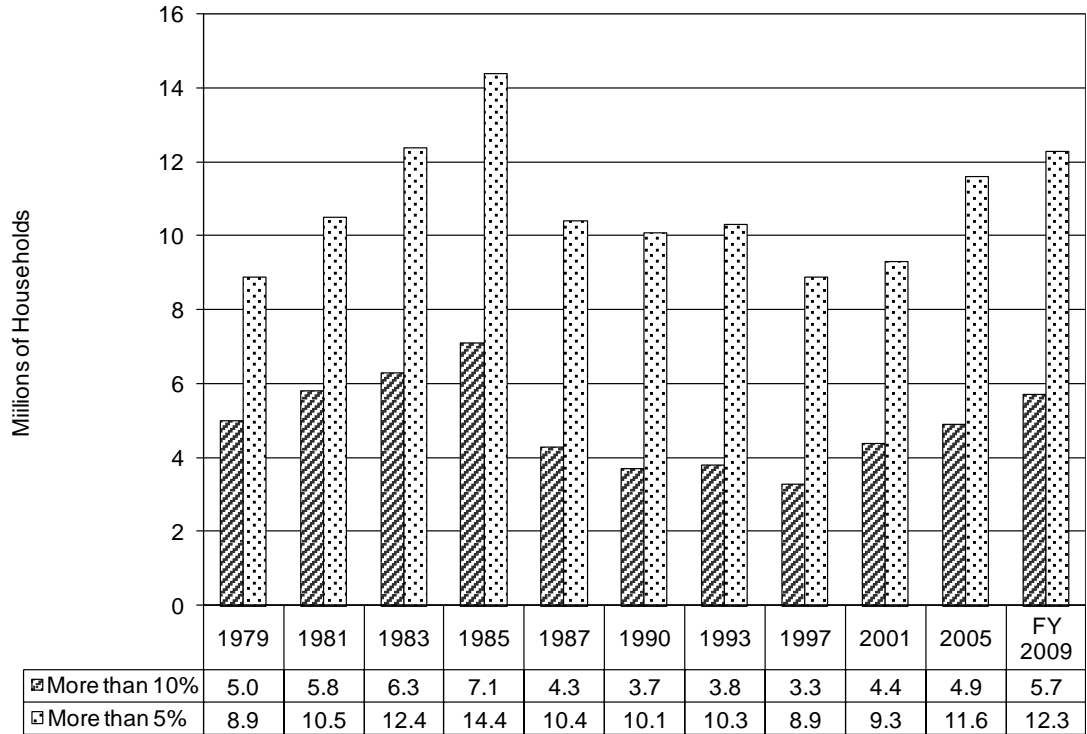


Figure 3-9. Percent of low income households spending over 5 percent and 10 percent of income on home energy, 1979 to FY 2009

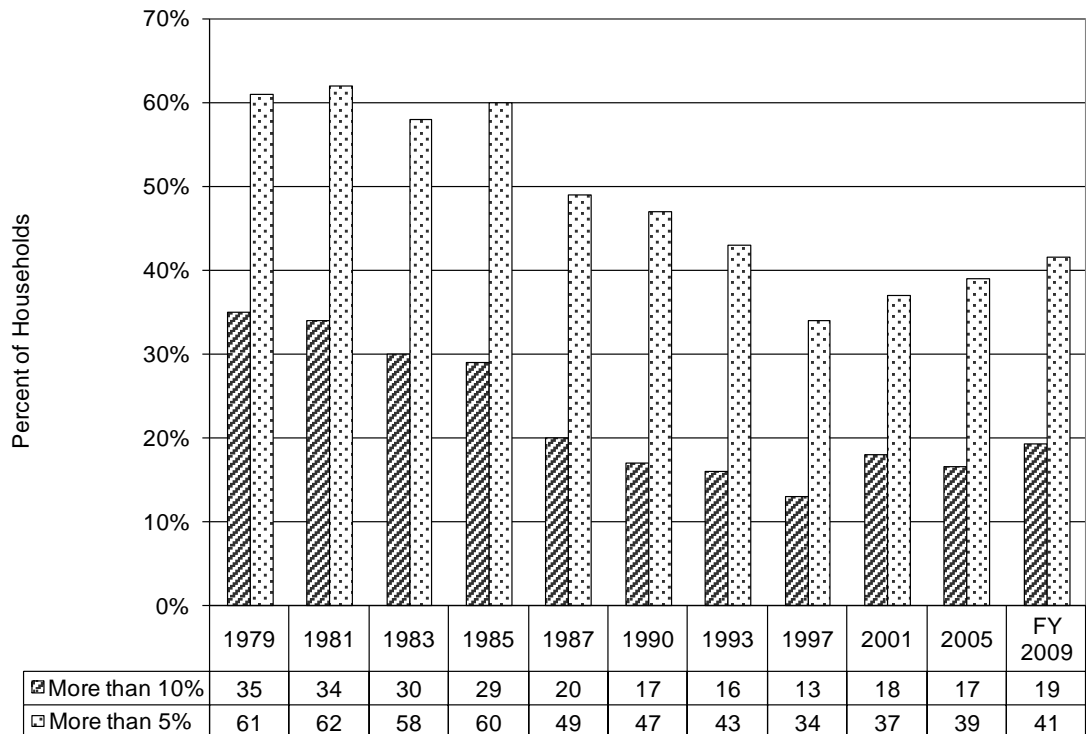


Figure 3-10 shows the total assistance funding that would be required to reduce the home energy burden for all low income households to 10 percent of income and 5 percent of income.²⁹ The amount required for a reduction in the home energy burden of low income households to 5 percent of income was \$2.2 billion in 1979, \$4.6 billion by 1985, \$3.3 billion in 2001, \$5.5 billion in 2005, and \$7.4 billion in FY 2009. 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 2009, 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 2009

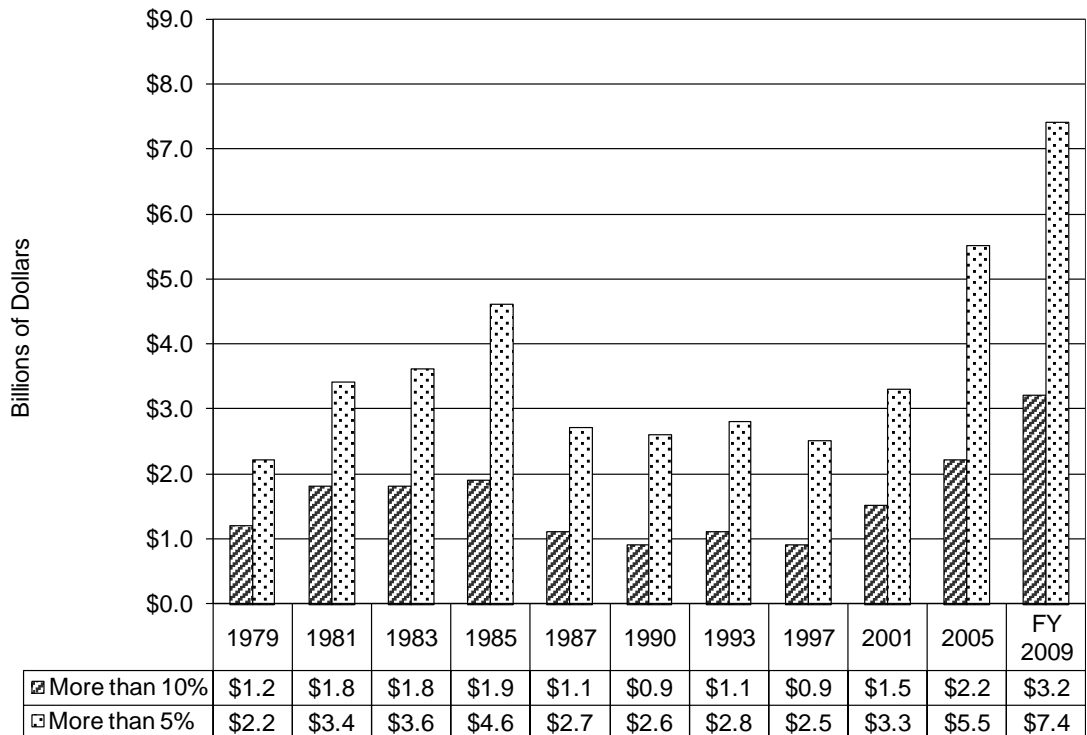


Figure 3-11 furnishes statistics on the number of low income households that had residential energy expenditures that exceeded specified levels. Figure 3-12 furnishes statistics on total fuel assistance dollars needed to reduce residential energy burden to specified levels. Figure 3-11 shows that the 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

²⁹ 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 2009 than during the peak years, they were higher in FY 2009 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 2009.

Figure 3-11. Number of low income households spending over 15 percent and 25 percent of income on residential energy, 1979 to FY 2009

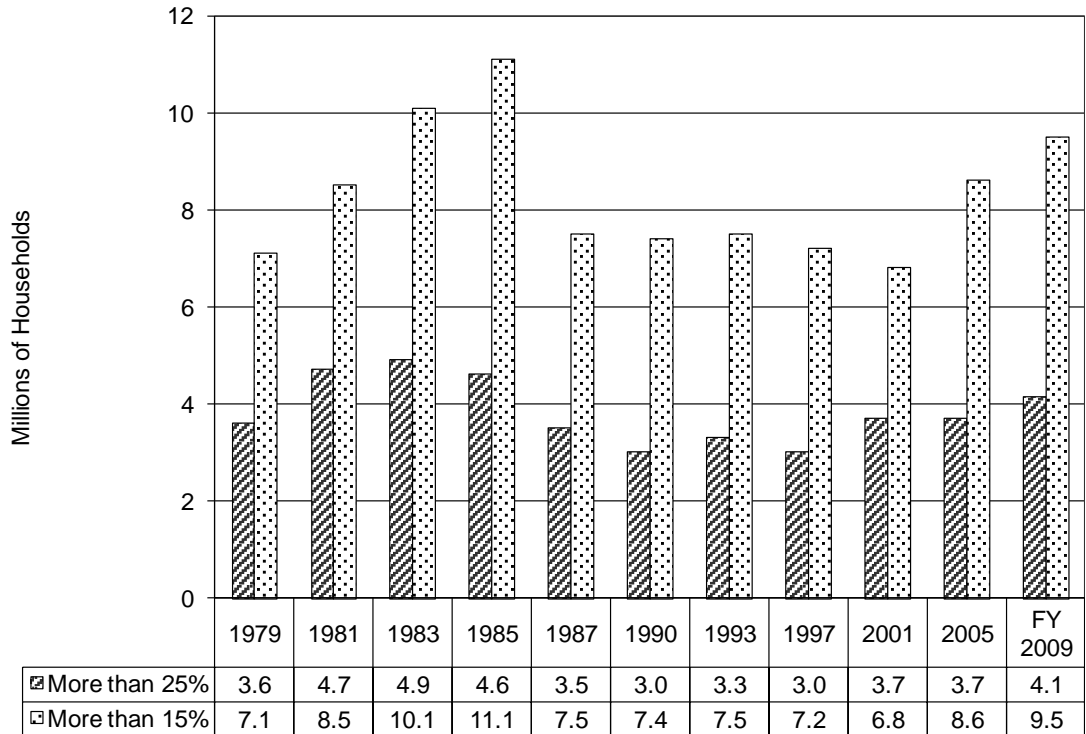


Figure 3-12. Total fuel assistance dollars needed to reduce low income household spending on residential energy to 15 percent and 25 percent of income, 1979 to FY 2009

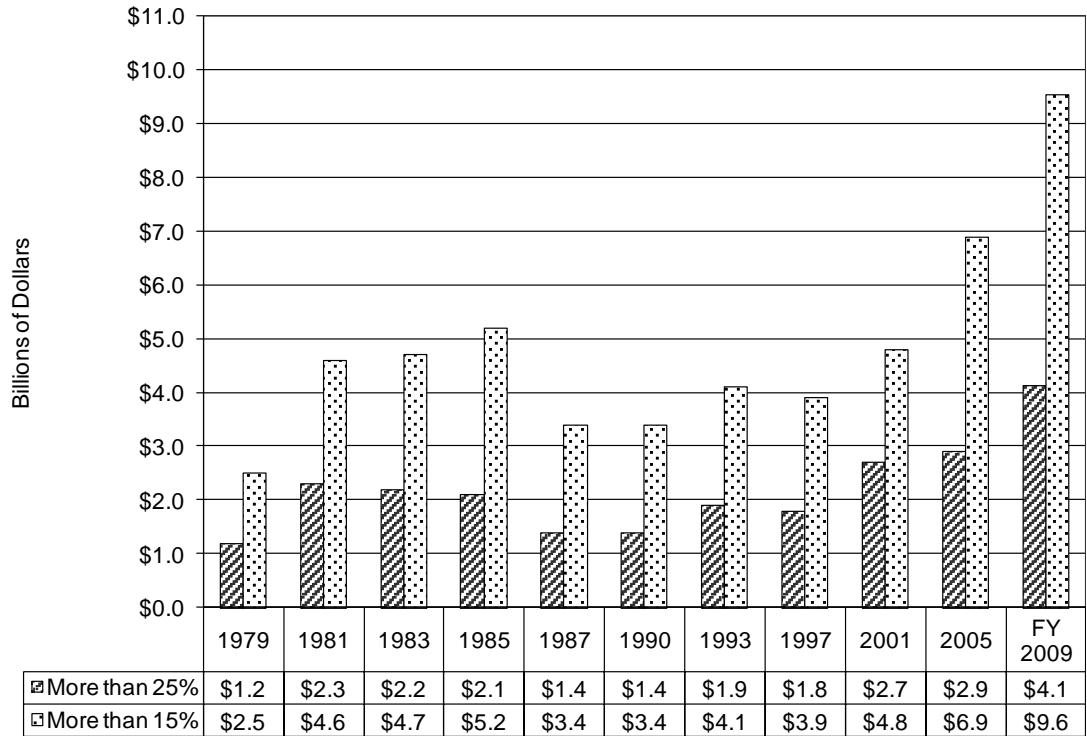


Figure 3-13 shows how the aggregated residential energy bill for all low income households has changed from 1979 to FY 2009. In 1979, the aggregated home energy bill (heating costs plus cooling costs) for low income households was \$4.5 billion. By FY 2009, the aggregated home energy bill had grown to \$18.5 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 2009, home energy costs accounted for 42.0 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 2009

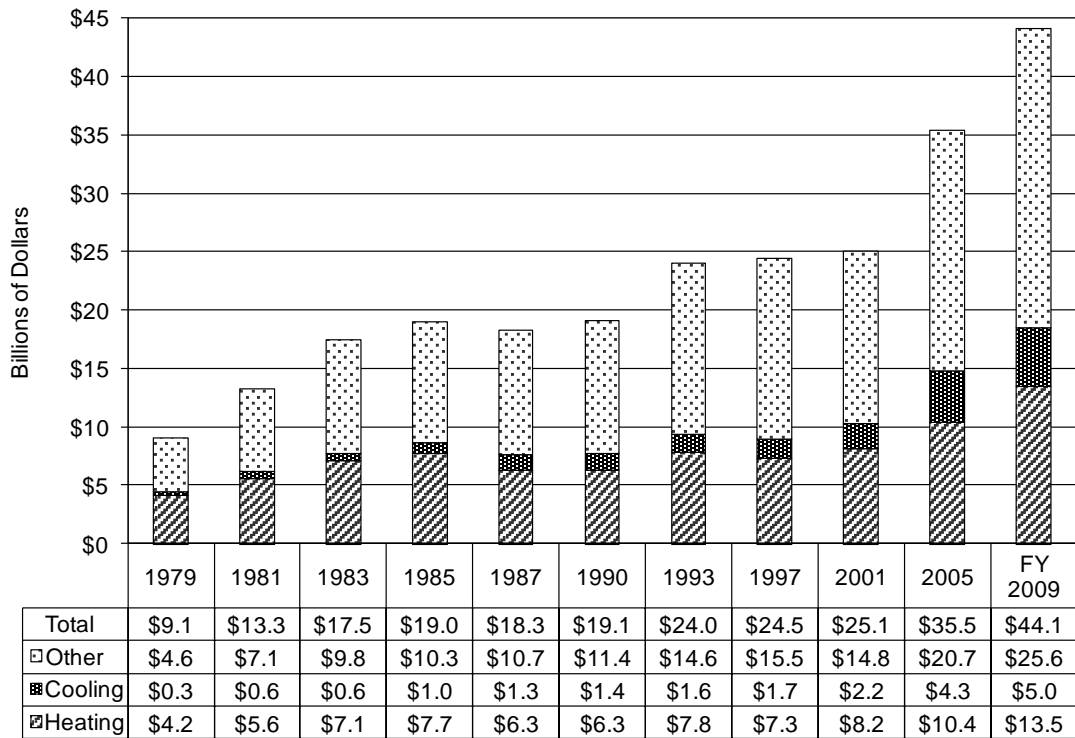
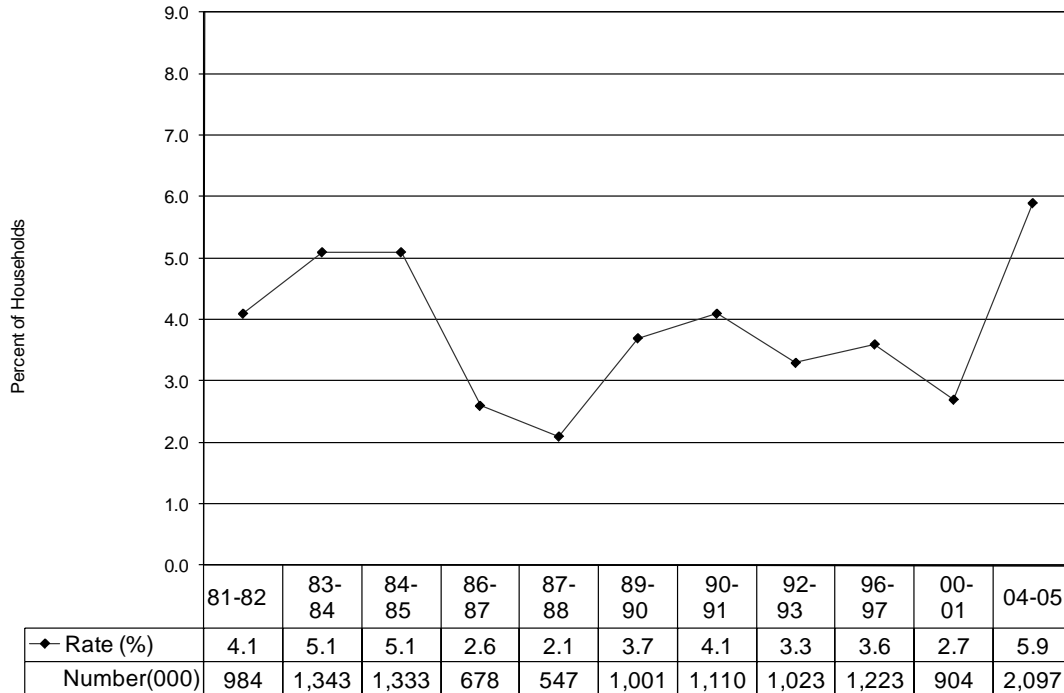


Figure 3-14, on the next page, demonstrates the impact of the inability to afford home energy on LIHEAP income eligible households. It shows the number of LIHEAP income eligible households that reported that they were unable to use their main source of heat for a period of two hours or more during the 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 season³⁰



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 2009. 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

³⁰Data 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 2009, fuel prices increased by 19 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 2009

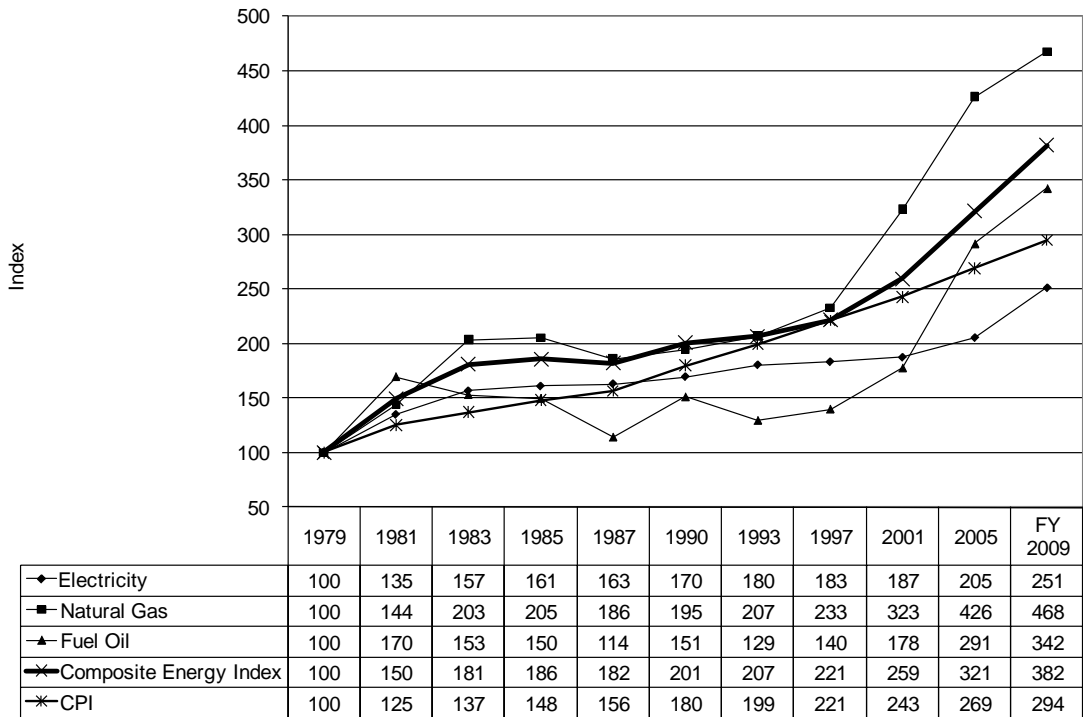


Figure 3-16 demonstrates how changes in heating energy consumption among low income households from 1979 to FY 2009 compared to changes in heating degree days for the same period. From 1979 to 1983, home heating consumption fell more rapidly than did heating degree days, suggesting a significant increase 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 2009, both consumption and heating days increased by almost equal percentage, leaving consumption per heating degree unchanged.

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 2009

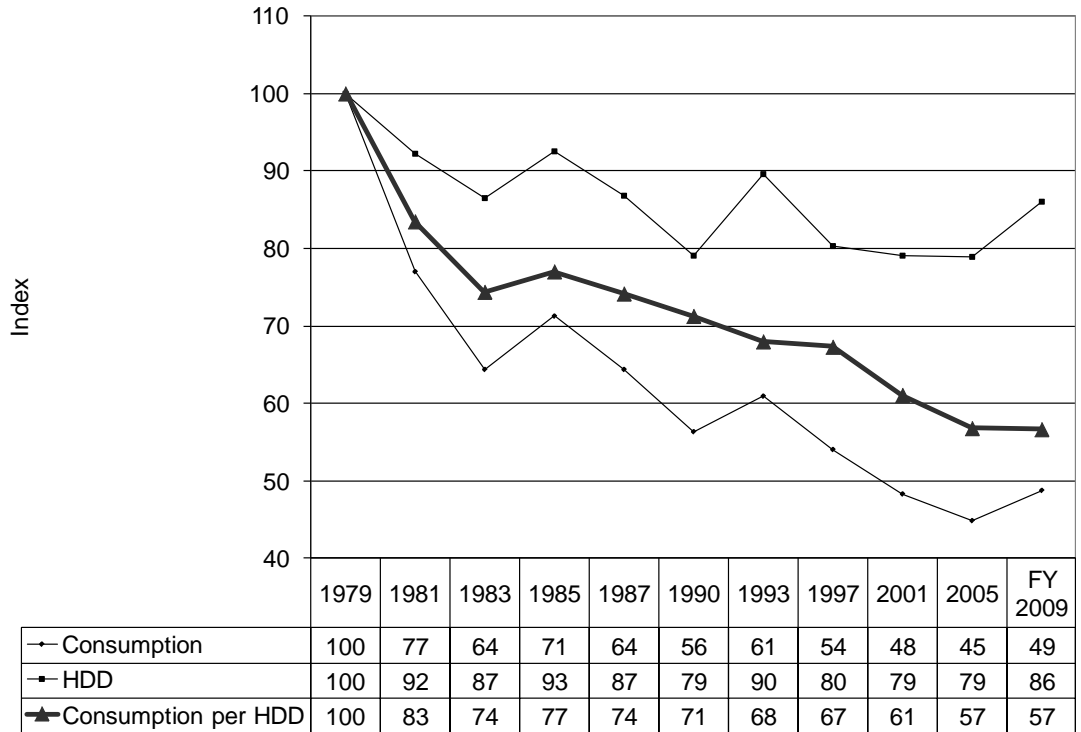
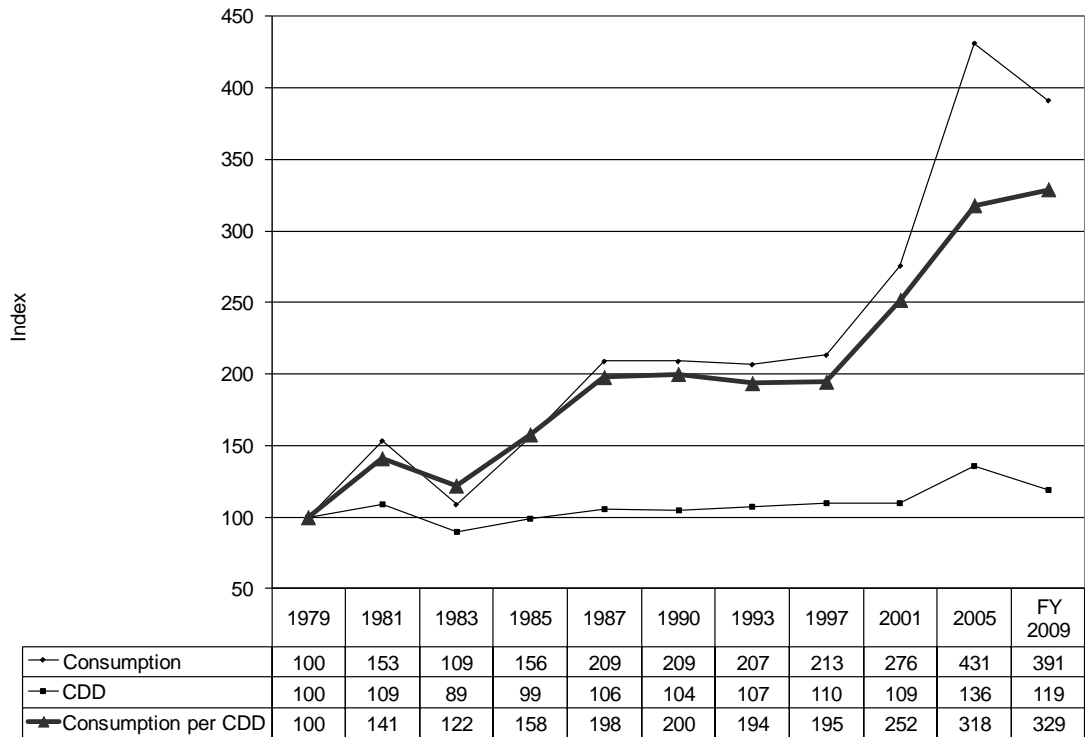


Figure 3-17 shows that home cooling consumption trends among low income households are somewhat more complex than are home heating consumption trends. In FY 2009, mean home cooling consumption was much higher than it was in 1979, even though households experienced only slightly more cooling degree days. Thus, mean consumption per cooling degree day increased substantially from 1979 to FY 2009, 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.³¹ 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 2009 or year-to-year changes in consumption in response to changes in cooling degree days.

³¹Air-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 2009



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 2009, the mean group home energy burden for all households was 1.3 percent, and that for low income households was 5.7 percent. In FY 2009, the mean group residential burden was 3.2 percent for all households and 13.5 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 2009, 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 2009

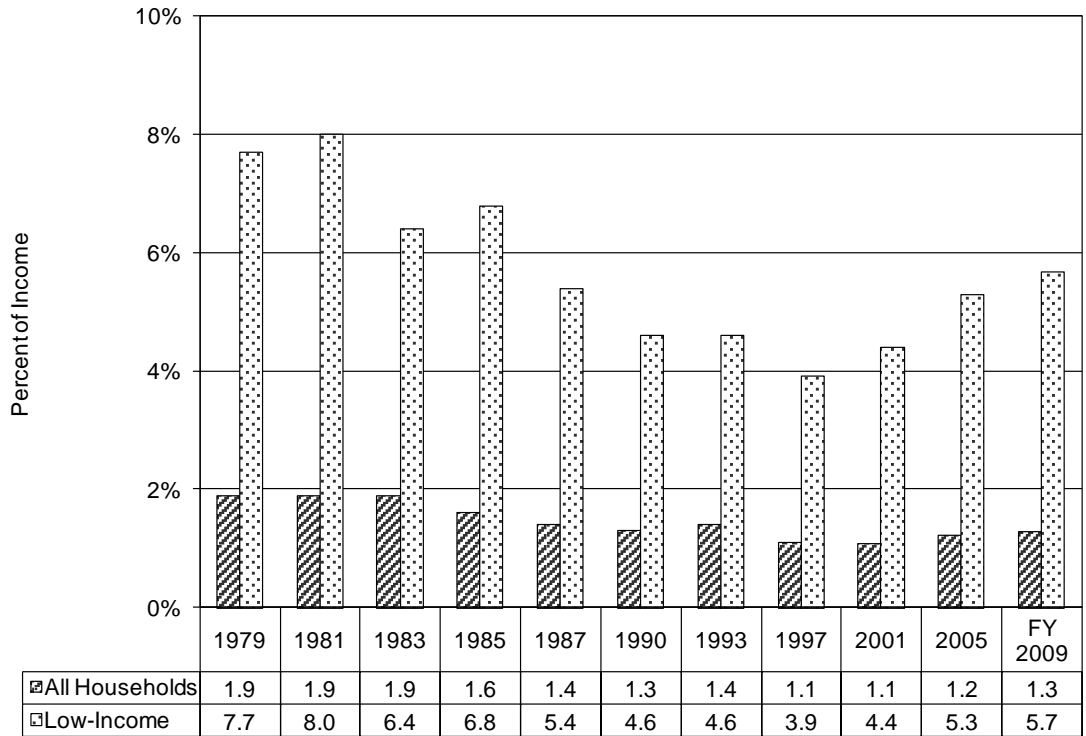
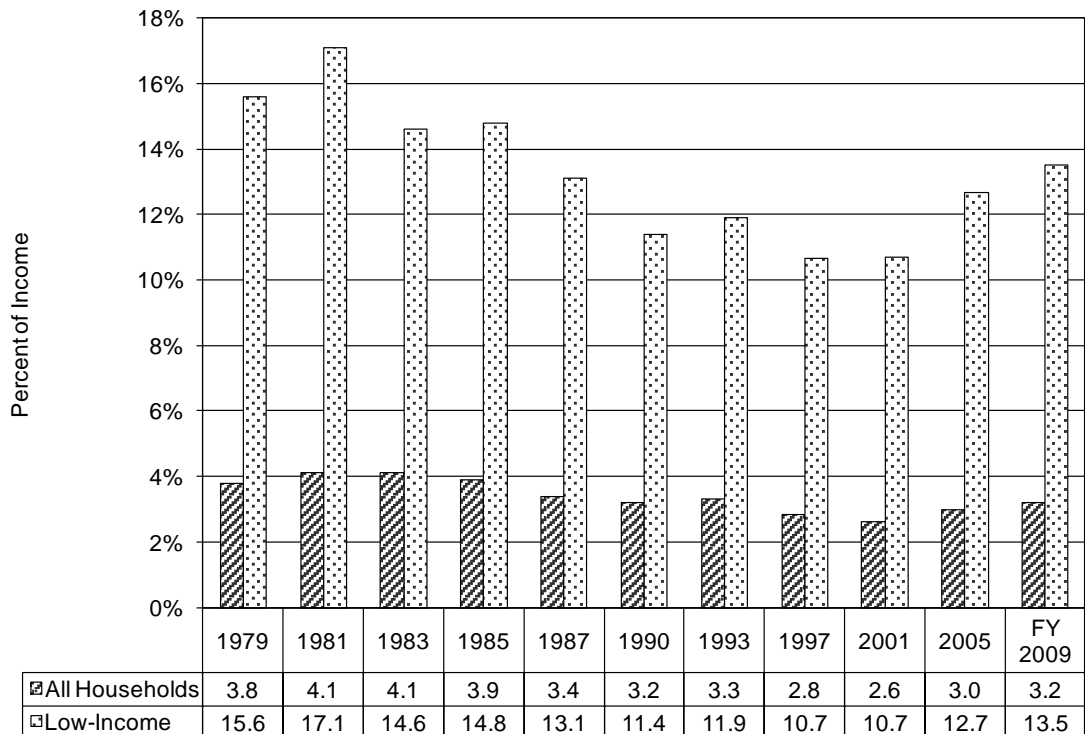


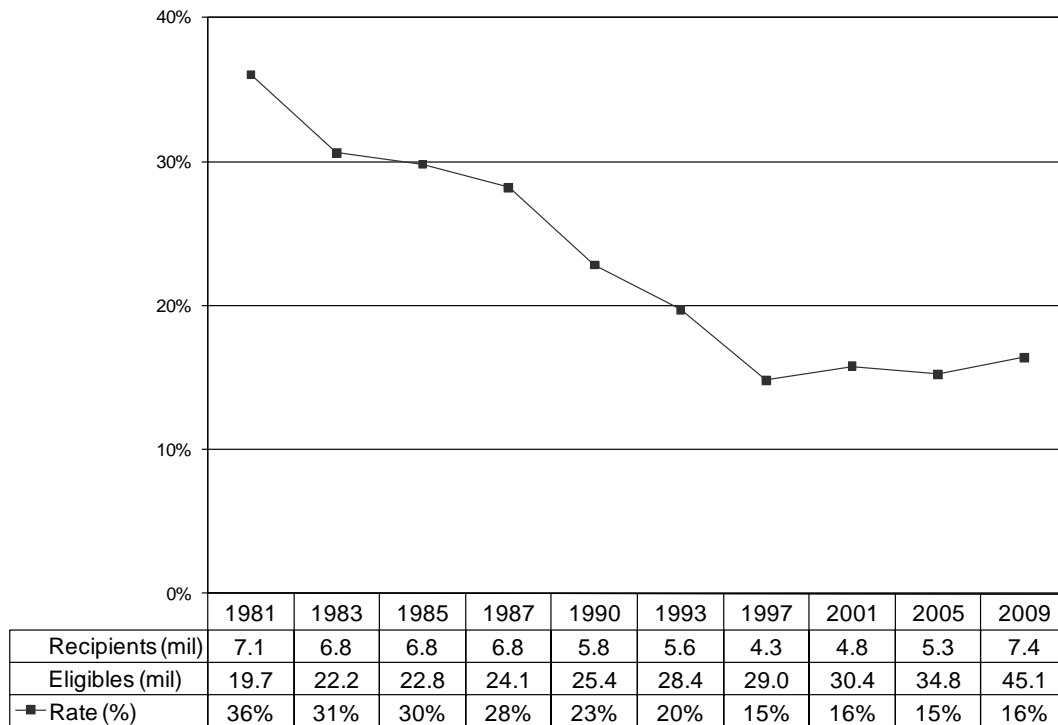
Figure 3-19. Mean group residential energy burden for all households and for households with incomes at or below 150 percent of HHS' poverty guidelines, 1979 to FY 2009



Trends in LIHEAP

Figures 3-20 through 3-24 furnish information on trends for HHS' energy assistance programs from FY 1981 through FY 2009. 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. In FY 2009, 16 percent of LIHEAP income eligible households received those benefits.³² 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 2009

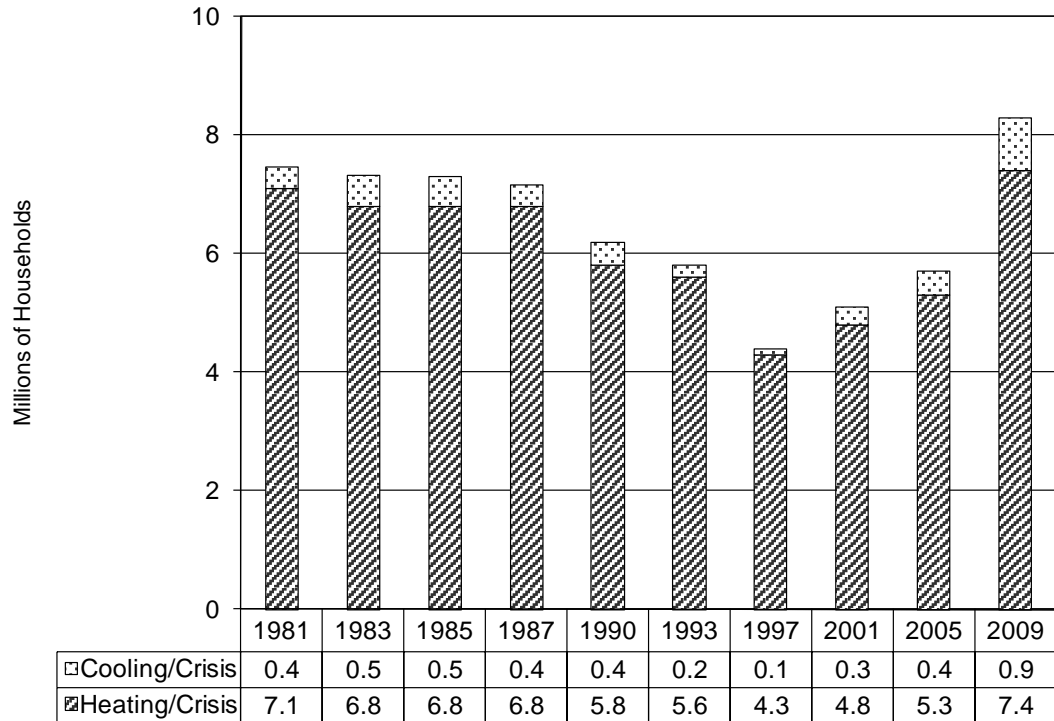


NOTE: The FY 1981 and FY 2009 estimate of income eligible households are not directly comparable to those of the other years because the income eligibility guidelines for the FY 1981 and FY 2009 programs differed from those of other years. If the previous Federal maximum LIHEAP income standard – the greater of 150 percent of HHS Poverty Guidelines or 60 percent of State median income – were used in the calculations, the number of income eligible households in FY 2009 would have been 35.0 million.

SOURCE: HHS Administrative Data — such data for FY 2009 are preliminary; thus the actual figures may differ.

³²Note that the Federal income eligibility guidelines for the FY 1981 Low Income Energy Assistance Program (LIEAP) and the FY 2009 LIHEAP were different from the LIHEAP programs in other years included in the table.

Figure 3-21. Number of households receiving LIHEAP/LIHEAP heating and/or winter crisis assistance or cooling and/or summer crisis assistance, FY 1981 to FY 2009^{1/}

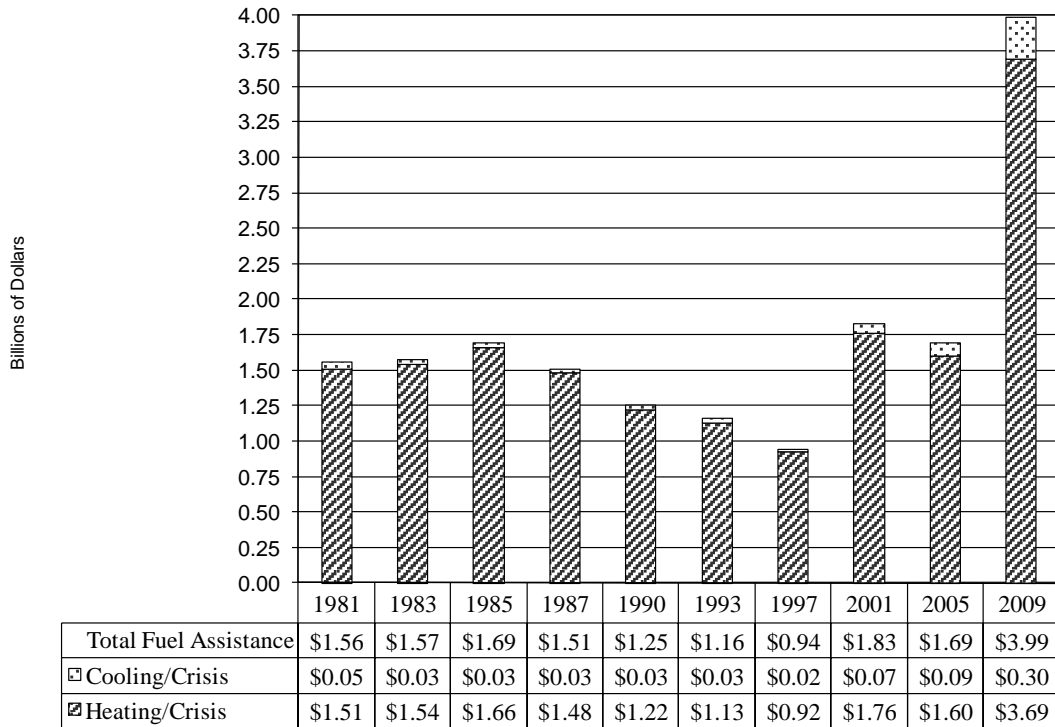


SOURCE: HHS Administrative Data — such data for FY 2009 are preliminary; thus the actual figures may differ.

^{1/}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 2009, when \$3.99 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. In FY 2009, Congress provided LIHEAP with \$5.1 billion in funding which is the highest level of funding the program has received.

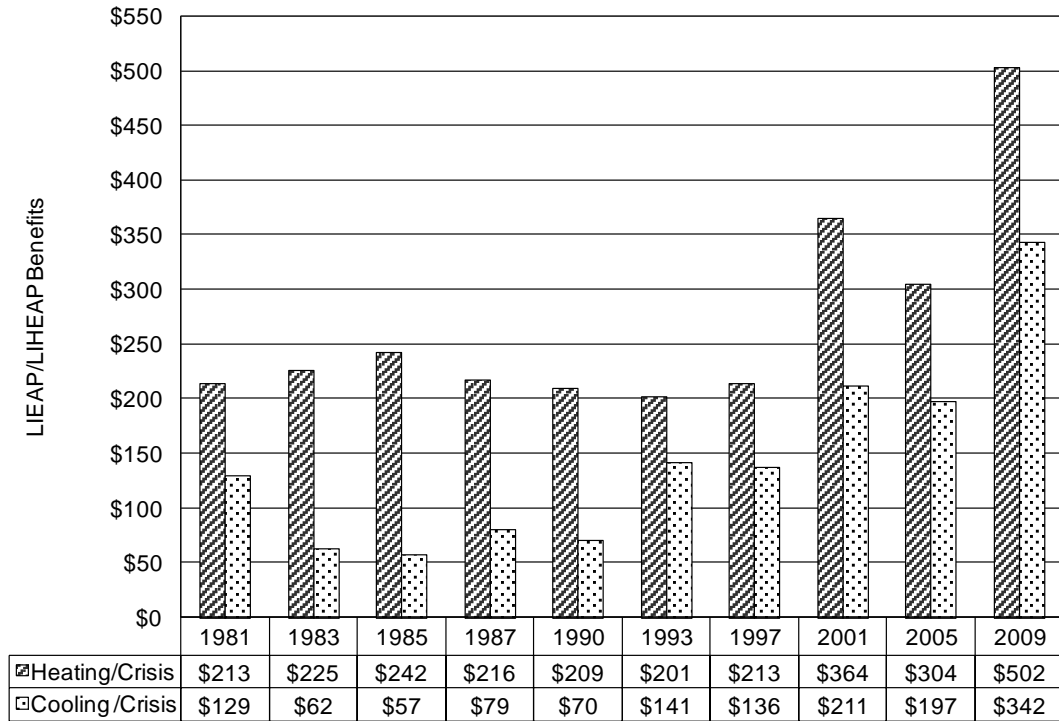
Figure 3-22. Funds used for LIEAP/LIHEAP fuel assistance, FY 1981 to FY 2009



SOURCE: HHS Administrative Data — such data for FY 2009 are preliminary; thus the actual figures may differ.

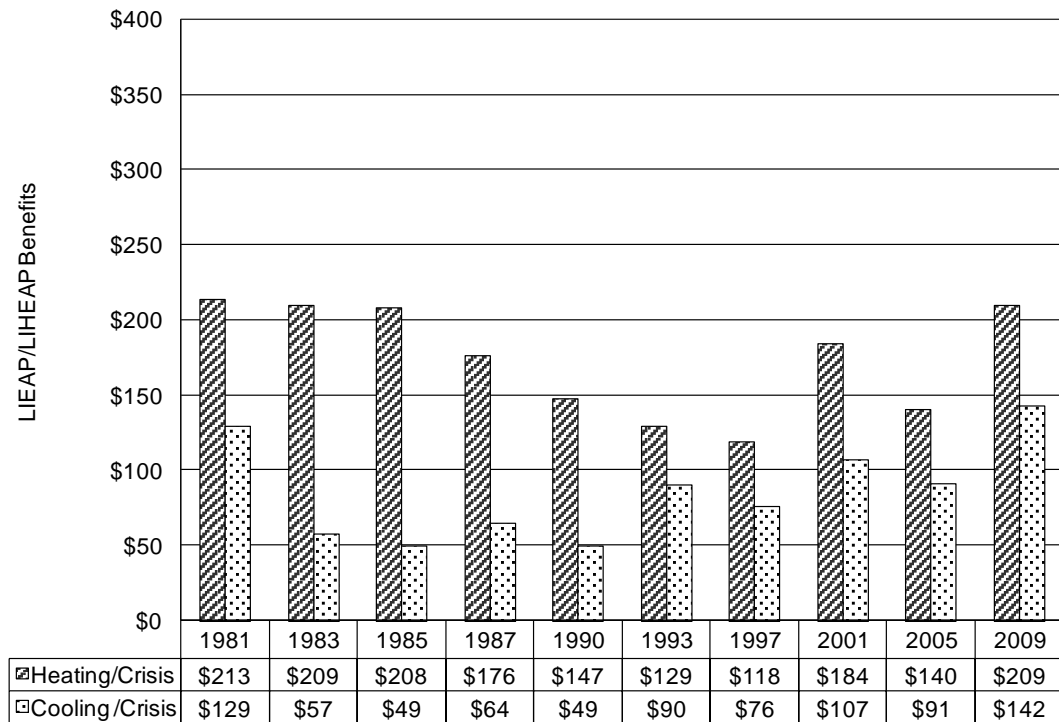
Figure 3-23 on the following page shows that, for the years shown, mean heating/winter crisis benefits were \$213 in FY 1981, grew to \$242 in FY 1985, fell back to \$213 in 1997, rose to \$364 in FY 2001, dropped to \$304 in FY 2005, and then rose substantially to \$502 in FY 2009. Figure 3-24 shows that, after adjusting for inflation, with the exception of FY 2009, 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 \$140 in FY 2005. In FY 2009, mean heating benefits increased considerably to \$209. With the exception of FY 1981, mean cooling benefits ranged, in 1981 dollars, from \$49 to \$90 through FY 1997, then rose to \$107 in FY 2001, then fell to \$91 in FY 2005. In FY 2009, mean cooling benefits increased substantially to \$142. 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 2009



SOURCE: HHS Administrative Data — such data for FY 2009 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 2009



SOURCE: HHS Administrative Data — such data for FY 2009 are preliminary; thus the actual figures may differ.

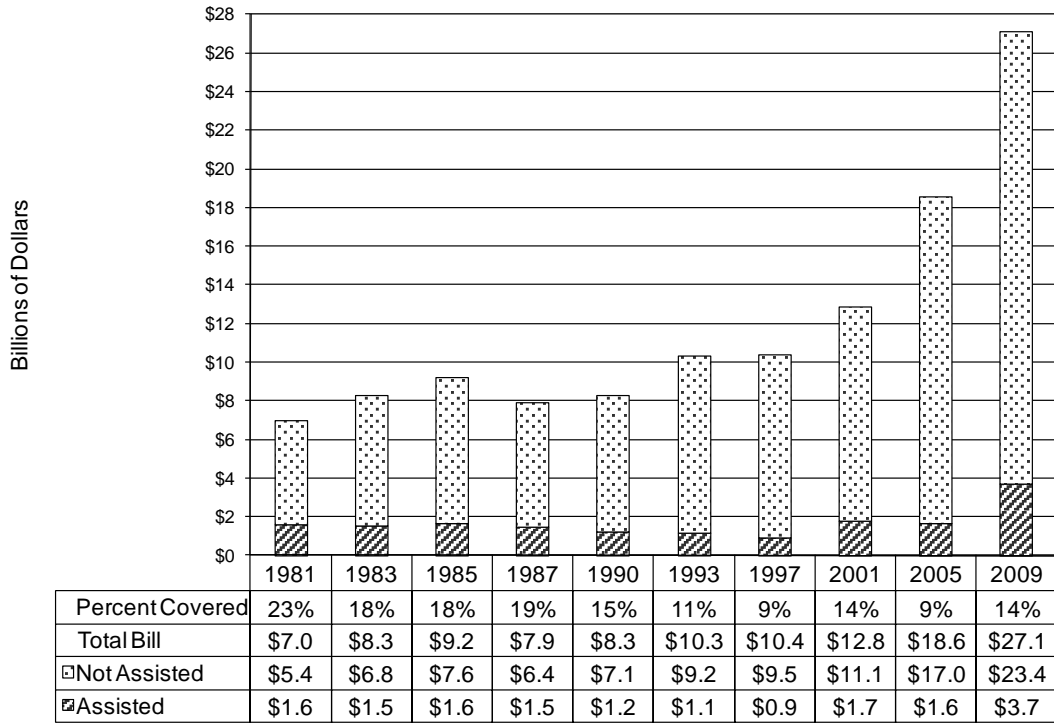
Analysis of LIHEAP benefits

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

Figure 3-25 shows that the LIHEAP heating coverage rate fell from 23 percent in FY 1981 to 14 percent in FY 2009. An increase in the size of the total bill and a substantial increase in the number of households eligible for assistance benefits caused this reduction.

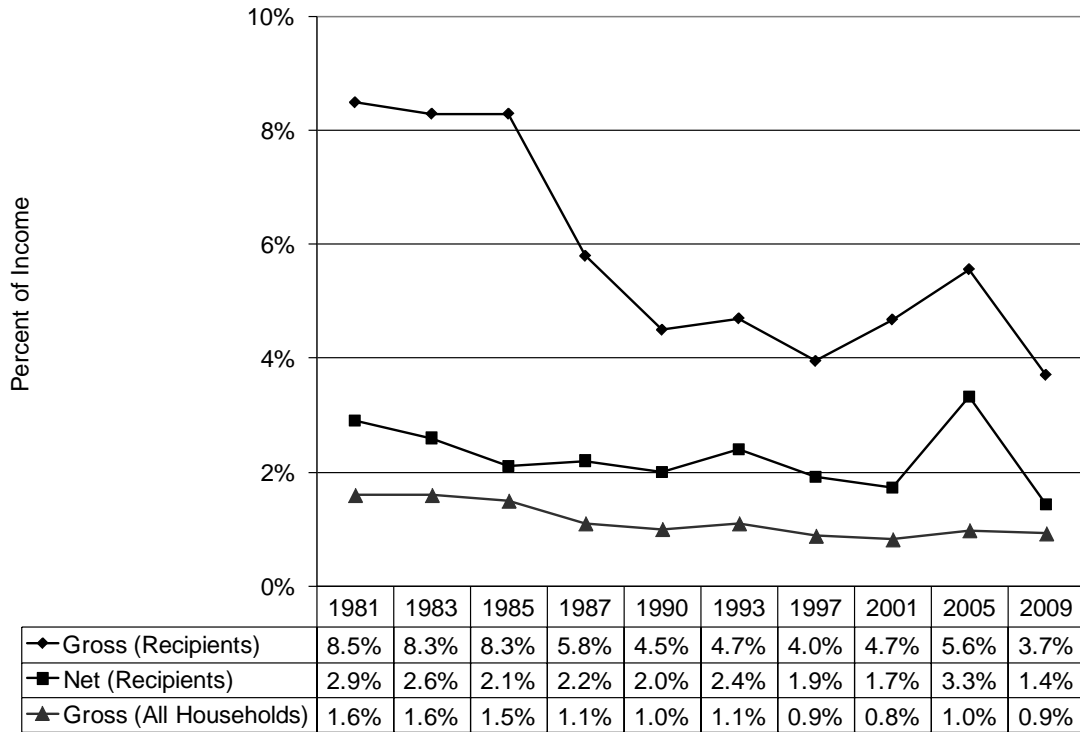
Figure 3-26 shows that the net effect of LIHEAP has been to lower recipient group home heating burdens to levels that are much closer to the levels of the average household. In FY 1981, the gross mean group home heating burden for LIHEAP recipients was 8.5 percent, while the net mean group home heating burden (with home heating expenditures taken after deducting LIHEAP benefits) was 2.9 percent. In FY 2009, the gross mean group home heating burden for LIHEAP recipients was 3.7 percent, while the net mean group home heating burden was 2.1 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 when that ratio was more than 3 to 1. In FY 2001, significant increases in the mean heating benefit caused the net mean group home heating burden for LIHEAP recipients to fall to 1.7 percent, however it remained twice as high as the mean group burden for all households. In FY 2005, the mean heating benefit decreased by 16 percent, and net mean group home heating burden almost doubled, increasing by 94 percent. The changes in net mean group heating burden resulted from the combination of mean heating benefit decrease and much higher fuel prices in FY 2005. In FY 2009, the net mean group home heating burden for LIHEAP recipients decreased substantially to 1.4 percent due to an increase in mean heating benefit and an increase in LIHEAP Federal income guidelines.

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 2009



SOURCE: Assistance number from HHS data and heating bill estimates from RECS — HHS data for FY 2009 are preliminary; thus the actual figures may differ.

Figure 3-26. Mean group home heating burden for all households and LIHEAP/LIHEAP heating and winter crisis recipient households, FY 1981 to FY 2009



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 the fact that the Federal government does not provide LIHEAP assistance to the public. Instead, the Federal government provides funds to States, certain Federal- or State-recognized Indian Tribes and Tribal Organizations, and 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 2009, 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 100.³³ For example, if high burden recipients have their median individual energy burden reduced by 25 percent (e.g., from 8 percent of income to 6 percent of income) and all recipient households have their median individual energy burden reduced by 20 percent (e.g., from 5 percent of income to 4 percent of income), the burden reduction targeting index is 125 (100 times 25 divided by 20).

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

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

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

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

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

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

ACF's annual LIHEAP performance measures are:

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

³³In 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.³⁴
- 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.³⁵

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.

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:

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

³⁵ *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.³⁶
- 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 2009 were available in October 2009.
- Federal LIHEAP Household Report – The preliminary LIHEAP Household Reports for FY 2009 were due from the States by September 1, 2009, when the States' LIHEAP block grant applications for FY 2010 were due. ACF set a goal for the States to submit their final LIHEAP Household Report for FY 2009 by December 2009. Each LIHEAP Household Report needs to be received, reviewed, processed, and compared against data from each State's Federal LIHEAP Grantee Survey for FY 2009 that was conducted in February 2010. The data on the number of LIHEAP households assisted in FY 2009 will be included in the *LIHEAP Report to Congress* for FY 2009.
- 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.

³⁶ "Guidance about Income Sources." U.S. Census Bureau. Housing and Household Economics Statistics Division. October 1, 2010. <http://www.census.gov/hhes/www/income/method/guidance/index.html>.

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.³⁷

- 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 2009. The first column in the table restates the performance goal. The second column shows

³⁷ 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 2009 targeting index scores fluctuated between 76 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, in FY 2009, the targeting index for households with a young child increased to 117.³⁸

Table 4-1. LIHEAP reciprocity targeting performance measures reported for FY 2003 – FY 2009

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 09	96	76
	FY 08	96	76
	FY 07	94	78
	FY 06	92	77
	FY 05	84	79
	FY 04	82	78
	FY 03	Baseline	79
1B. Maintain the reciprocity targeting index score of LIHEAP households having at least one member five years or younger	FY 09	122	117
	FY 08	122	110
	FY 07	122	110
	FY 06	122	112
	FY 05	122	113
	FY 04	122	115
	FY 03	Baseline	122

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.³⁹ However, FY 2005

³⁸ If the new Federal LIHEAP maximum income standard – the greater of 150 percent of HHS Poverty Guidelines or 75 percent of State median income – were used in calculations, the targeting index would have been 77 for elderly households and 122 for young child households in FY 2009.

³⁹ 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

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

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.

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.⁴⁰

- 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.⁴¹

- 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

⁴⁰ 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.

⁴¹ 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. SIPP Study of Energy Affordability

The Census Bureau's Survey of Income and Program Participation (SIPP) is a national panel survey that collects comprehensive information on income and program participation of individuals and households. The same respondents are surveyed every four months for up to four years in each panel. As part of its topical modules, the SIPP collected information on household energy affordability problems and household assets in 2005. 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) commissioned a study to analyze energy affordability problems for low income households using the 2005 SIPP data and to compare the SIPP findings with those of the Energy Information Administration's 2005 Residential Energy Consumption Survey (RECS) to assess the consistency of the findings between the two surveys. This section of the Notebook presents information on this study.

Study goals

The LIHEAP Special Study of Energy Insecurity using the 2005 RECS furnished extensive information on the types and levels of Energy Insecurity that low income households face.⁴² This study is a follow-up to the 2005 RECS study to assess the consistency of the findings between the 2005 RECS and the SIPP and perform additional analyses using the SIPP to furnish information on the energy affordability problems of low income households.

The study had four objectives:

- Level and Type – Computation of the rate of bill payment problems and energy service disconnections from the SIPP and comparison of the findings from the SIPP to those from the RECS for the same population to assess the consistency of the findings between the two surveys.
- Geographic and Demographic – Computation of the geographic and demographic dimensions of bill payment problems and energy service disconnections from the SIPP and comparison of the findings from the SIPP to those from the RECS for the same population to assess the consistency of the findings between the two surveys.
- Special Analysis of Income Dynamics and Assets– An analysis of income dynamics and household assets for elderly and non-elderly low income households to investigate the extent to which the differences between elderly and non-elderly households can be explained by income dynamics and assets.
- Special Analysis of Income Groups – An analysis of bill payment problems and energy service disconnections for households with income between 60 percent and 100 percent of State median income.

⁴² *LIHEAP Energy Insecurity Study included in the Office of Community Services' LIHEAP Home Energy Notebook for Fiscal Year 2008, May 2010, prepared by APPRISE Incorporated under contract #DE-AM01-04EI41006.*

Level and type of energy affordability problems

The SIPP is a longitudinal survey that collects information on topics such as poverty, income, employment, and health insurance coverage. The SIPP *core content* covers demographic characteristics, work experience, earnings, program participation, transfer income, and asset income. Each interview wave contains additional *topical content*, including one or more *topical modules*, allowing the Census Bureau to address a range of subjects. The 2004 SIPP Panel *Adult Well-Being Module*, which was administered in 2005, contained questions on energy affordability problems. Information collected included whether the household had trouble paying energy bills, whether the energy service was shut off, and the source of help received for paying bills and/or turning the service back on. These questions are administered to the entire body of the respondents.

The 2005 RECS included a detailed set of questions that documented the different types of energy affordability problems that low income households face. These questions were administered only to the respondents that were deemed to be LIHEAP income eligible under the Federal maximum LIHEAP income guidelines.⁴³

SIPP and RECS energy Affordability Questions

The first step in the study was to identify all the questions related to energy affordability in the SIPP. There are two questions in the SIPP that ask about whether the household had problems paying home energy bills and whether the household had a service disconnection in the past 12 months. In addition, there were a number of questions that asked about the source of help when the household experienced these problems.

The second step was to identify the 2005 RECS questions that are most comparable to those in the SIPP. Table 5.1 presents information on these SIPP and RECS energy affordability questions and information on how households were categorized as having “problems paying energy bills” and having “energy service disconnections” in the SIPP and RECS for the purpose of the study.⁴⁴

The RECS questions were more detailed, as they collected information not only on whether the household experienced problems paying energy bills or energy service disconnections but also on how often the household experienced these problems. One important distinction between the RECS and SIPP questions on energy service disconnections is that the RECS collects information only on service disconnections when heat or cooling is wanted, while SIPP collects information on all service disconnections in the past 12 months. For example, information reported by RECS on service disconnections would exclude spring service shutoffs in moratoria States when heat is not needed.

⁴³ The Federal maximum LIHEAP eligibility standard was the greater of 150 percent of HHS Poverty Guidelines and 60 percent of State median income in 2005.

⁴⁴ In the SIPP, the service disconnection question was only asked to the respondents that indicated that there was a time in the past 12 months that they did not pay the full amount of their energy bill. To be consistent, the RECS analysis of service disconnections is restricted to those households that reported skipping or paying less than the full energy bill in the past 12 months.

Table 5.1. Energy Affordability Questions in the SIPP and RECS

	SIPP	RECS
Problems Paying Energy Bills	<p>“Yes” to the following question:</p> <p>[AW41_NEED3] How about not paying the full amount of the gas, oil, or electricity bills? Was there a time in the past 12 months when that happened to ***?</p>	<p>“Almost every month”, “some months”, or “only 1 or 2 months” to the following question:</p> <p>[SCALED] In the past 12 months, did you skip paying your home energy bill or pay less than your whole home energy bill because there wasn't enough money for your home energy bill?</p>
Energy Service Disconnections	<p>“Yes” to the following question:</p> <p>[AW44_NEED4] In the past 12 months did the gas or electric company turn off service, or the oil company not deliver oil?</p>	<p>“Yes” to any one of the following questions:</p> <ul style="list-style-type: none"> a. [K-3b] Was there ever a time during the past 12 months when you wanted to use your main source of heat, but could not, because you ran out of fuel oil, kerosene, propane (bottled gas), coal, or wood because you were unable to pay for a delivery? b. [K-3c] Was there ever a time during the past 12 months when 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? c. [K-3d] Was there ever a time during the past 12 months when 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? d. [K-4b] Was there ever a time during the past 12 months when 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?

Comparison of SIPP and RECS Findings

Table 5.2 furnishes information on the incidence of energy bill payment problems and service disconnections for low income households from the SIPP and RECS.⁴⁵ The SIPP indicates a smaller incidence of energy bill payment problems and service disconnections for low income households. While the SIPP shows that about 19.5% of low income households had problems paying their bills, the RECS shows that 26.3% of those households did that. Moreover, according to the SIPP, about 3.5% of low income households had their service disconnected, compared to 5.0% according to the RECS. It is important to note that according to the SIPP, there were about 30.9 million households that were income eligible for LIHEAP in 2005, compared to 35.9 million according to the 2005 RECS.

Table 5.2. Energy Affordability Problems for Low Income Households, SIPP vs. RECS, 2005

	RECS		SIPP	
	Number	Percent	Number	Percent
Bill Payment Problems	9,458,504	26.3%	6,018,547	19.5%
Service Disconnections	1,810,016	5.0%	1,071,140	3.5%
All Households	35,945,337	100%	30,876,500	100%

SOURCE: 2005 RECS and 2004 SIPP Panel

These findings suggest that there are some important differences between the RECS and the SIPP findings that raise some concerns about the accuracy of the findings from both surveys. For example, even though the RECS indicates a higher incidence of energy service disconnections, the RECS figure is an underestimate of the total incidence of energy service shutoffs because the figure ignores service disconnections during the periods when heat or cooling is not needed.

Geographic and demographic dimensions of energy affordability problems

The Special Study of the 2005 RECS found some significant differences in the incidence of financial Energy Insecurity among different Census regions, income groups, and vulnerability groups. This section of the report presents tabulations of the SIPP and RECS data that furnish information on household energy affordability problems for the following dimensions:

- Geography – National and Census Region
- Percentage of HHS Poverty Guidelines– At or Above 100% of HHS Poverty Guidelines, Above 100% of such guidelines but at or Below 150% of such guidelines, Above 150% of such guidelines but at or below the Federal maximum LIHEAP income standard
- Vulnerability – Elderly Households, Young Child Households, Other Households

⁴⁵ 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).

Geography

Table 5.3 furnishes information on the incidence of energy bill payment problems and service disconnections by Census Region for low income households from the SIPP and RECS. For every Census region, the SIPP shows a smaller incidence of bill payment problems than the RECS. Moreover, the SIPP indicates a relatively smaller difference among the Census regions. For every Census region, the SIPP also indicates a smaller incidence of energy service disconnections. The difference between the RECS and SIPP figures is especially pronounced for the West region. However, both the SIPP and RECS indicate that the low income households in the South region experience service disconnections at the highest rate.

Table 5.3. Number and Percent of Low Income Households with Energy Affordability Problems by Census Region, SIPP vs. RECS, 2005

Census Region	Energy Affordability Problem	RECS		SIPP	
		Number	Percent	Number	Percent
Northeast	Bill Payment Problems	1,746,979	23.6%	1,211,461	18.3%
	Service Disconnections	276,280	3.7%	190,222	2.9%
	All Households	7,404,560	100.0%	6,632,709	100.0%
Midwest	Bill Payment Problems	2,639,249	30.8%	1,605,073	23.0%
	Service Disconnections	430,376	5.0%	249,748	3.6%
	All Households	8,554,551	100.0%	6,990,393	100.0%
South	Bill Payment Problems	3,025,775	23.5%	2,098,705	18.8%
	Service Disconnections	743,410	5.8%	461,122	4.1%
	All Households	12,891,371	100.0%	11,180,924	100 %
West	Bill Payment Problems	2,046,502	28.8%	1,103,309	18.2%
	Service Disconnections	359,950	5.1 %	170,048	2.8%
	All Households	7,094,854	100.0%	6,072,474	100.0%

SOURCE: 2005 RECS and 2004 SIPP Panel

Poverty Level

Table 5.4 furnishes information on the incidence of energy bill payment problems and service disconnections by poverty level for low income households from the SIPP and RECS. Although the SIPP indicates a smaller incidence of bill payment problems and service disconnections for every poverty level than the RECS, both the SIPP and RECS data show that low income households with income at or below 100% HHS poverty guidelines are more likely to experience energy affordability problems than households with income above 100% HHS poverty level. On the other hand, the difference in the incidence of bill payment problems between households with income at or below 100% HHS poverty guidelines and households with income above 100% HHS poverty guidelines is more pronounced in the SIPP than the RECS.

It is important to note that while the SIPP distributes LIHEAP income-eligible households evenly between different poverty groups, the RECS places significantly more households in the at or below poverty group. One possible explanation for this finding is that while the SIPP reports the exact

income figure for a particular household, RECS reports a bracket for the household income – the middle point of the bracket is taken as the household income. Moreover, the SIPP collects much more detailed information on household income and income sources than the RECS, which might cause the reported income in the SIPP to be higher than that in the RECS.

Table 5.4. Number and Percent of Low Income Households with Energy Affordability Problems by Poverty Guidelines, SIPP vs. RECS, 2005

Poverty Group	Energy Affordability Problem	RECS		SIPP	
		Number	Percent	Number	Percent
<=100% Poverty Guidelines	Bill Payment Problems	4,608,727	29.5%	2,678,410	27.1%
	Service Disconnections	1,163,773	7.4%	574,757	5.8%
	All Households	15,648,776	100.0%	9,873,658	100.0%
>100-150% Poverty Guidelines	Bill Payment Problems	3,075,935	25.4%	1,834,904	17.3%
	Service Disconnections	400,684	3.3%	282,926	2.7%
	All Households	12,098,724	100.0%	10,621,868	100.0%
>150% Poverty Guidelines	Bill Payment Problems	1,773,843	21.6%	1,505,233	14.5%
	Service Disconnections	245,559	3.0%	213,457	2.1%
	All Households	8,197,838	100.0%	10,380,973	100.0%

SOURCE: 2005 RECS and 2004 SIPP Panel

Vulnerability Group

Table 5.5 furnishes information on the incidence of energy bill payment problems and service disconnections by vulnerability group for LIHEAP income-eligible households from the SIPP and RECS. Although the SIPP indicates a smaller incidence of bill payment problems and service disconnections for every vulnerability group than the RECS, both the SIPP and RECS data show that elderly low income households are less likely to experience energy affordability problems than other types of low income households. However, the difference between elderly and non-elderly households is more pronounced in the SIPP than the RECS.

Table 5.5 Number and Percent of Low Income Households with Energy Affordability Problems by Vulnerability Group, SIPP vs. RECS, 2005

Vulnerability Group	Energy Affordability Problem	RECS		SIPP	
		Number	Percent	Number	Percent
Elderly	Bill Payment Problems	1,530,085	11.6%	783,712	7.3%
	Service Disconnections	248,723	1.9%	81,528	0.8%
	All Households	13,154,592	100.0%	10,776,600	100.0%
Young Child	Bill Payment Problems	2,797,557	37.1%	1,999,505	29.0%

Vulnerability Group	Energy Affordability Problem	RECS		SIPP	
		Number	Percent	Number	Percent
	Service Disconnections	503,498	6.7%	418,887	6.1%
	All Households	7,549,242	100.0%	6,903,085	100.0%
Other	Bill Payment Problems	5,130,862	33.7%	3,235,330	24.5%
	Service Disconnections	1,057,795	6.9%	570,724	4.3%
	All Households	15,241,503	100.0%	13,196,815	100.0%

SOURCE: 2005 RECS and 2004 SIPP Panel

Summary of Findings

The study finds while there are some similarities in the findings from the RECS and the SIPP, there are also some important differences in the incidence of energy bill payment problems and energy service disconnections between the geographic and demographic subgroups that the study looked at.

Similarities include:

- Census Region – Low income households in the South Census region are more likely to experience bill payment problems and service disconnections than those in other Census regions.
- Poverty Level – Households with income at or below 100% of HHS poverty guidelines are more likely to experience energy affordability problems than households with income above 100% of HHS poverty guidelines.
- Vulnerability Group – Low income elderly households are significantly less likely to experience energy affordability problems than other types of low income households.

Differences include:

- SIPP shows a lower incidence of bill payment problems and energy service disconnections for low income households for every subgroup that the study looked at as well as for the whole population. Other differences include:
- Census Region – The SIPP shows smaller regional differences in energy affordability problems than the RECS.
- Poverty Level – The difference in the incidence of bill payment problems between the households with income at or below 100% poverty guidelines and the households with income above 100% of poverty guidelines is more pronounced in the SIPP than the RECS.

Caveats in Comparison of SIPP and RECS Findings

There are important caveats in comparison of the SIPP and RECS findings. The caveats include, but are not limited to, the following:

- Sampling and Non-sampling Errors – Since both surveys use a random sample to draw inferences about the population, estimates from both surveys are subject to sampling and non-sampling errors.
- Focus of Surveys – The SIPP is a survey of income and program participation. Since the main focus of SIPP is income, it is likely that SIPP provides more accurate income information than the RECS. On the other hand, the main focus of RECS is energy, so the RECS is more likely to provide more accurate information on the energy affordability problems.
- Survey Questions – The wording of survey questions are different in the two surveys. This makes it hard to make exact comparisons.
- Reference Period – Although both surveys were conducted in 2005 and asked about the incidence of energy affordability problems in the past 12 months, there are difference in the time of the year that the surveys were conducted.⁴⁶
- Sample Size – The SIPP sample size is significantly larger than the RECS sample size. Therefore, the statistics from the SIPP have smaller variances than those of the RECS.
- Statistical Significance – None of the differences between the pairs of values that this report uses to illustrate the differences between the surveys were tested for statistical significance.

Further research is needed to understand to what extent the above factors were responsible for the difference in findings with respect to the incidence of energy affordability problems for low income households between the two surveys.

Analysis of income dynamics and assets for elderly households

The tabulations of both the 2005 SIPP and 2005 RECS data showed that elderly low income households were less likely to experience energy affordability problems than other types of low income households. OCS was interested in further research to determine whether there are some observable factors that could explain the difference in the incidence of energy affordability problems between elderly and non-elderly households. This study hypothesized that households with greater amounts of assets and/or households with non-volatile monthly income would be less likely to experience energy affordability problems than households with less amounts of assets and/or households with volatile monthly income, and that income dynamics and assets could explain some of the observed difference between elderly and non-elderly households.

The SIPP contains information on household monthly income as part of its *Core Survey* and household assets and debt as part of its *Assets and Liabilities* module that allows for an analysis of income dynamics and assets for elderly and non-elderly low income households. The study used multiple regression models to investigate the extent to which the differences between elderly and non-elderly low income households could be explained by household assets and income dynamics.

Analysis of Assets

This section of the report first furnishes tabulations of household net worth (total assets minus total unsecured debt) for elderly and non-elderly households, and then uses multiple regression analysis to

⁴⁶ The 2004 SIPP *Adult Well-Being Module* was administered in June 2005 through September 2005, making the reference period June 2004-August 2005, while the 2005 RECS was administered in August 2005-January 2006. The differences in residential energy costs in the two reference periods might explain part of the difference in the incidence of energy affordability problems reported in the two surveys.

investigate the extent to which the differences in elderly and non-elderly low income households could be explained by household net worth.

Table 5.6 furnishes information on the average total net worth for three groups of elderly households:

1. Households with no bill payment problem and no service disconnection
2. Households with bill payment problem but no service disconnection
3. Households with both bill payment problem and service disconnection

Table 5.6 shows that elderly low income households that experienced a bill payment problem and/or service disconnection in the past 12 months have significantly lower net worth than those that did not experience any of the problems. However, among those elderly households that had a bill payment problem, the households that had their service disconnected had slightly higher net worth than those that did not.

Table 5.6. Average Net Worth for Elderly Low Income Households

Group	Number of Households	Mean Net Worth
No Bill Payment Problem and No Service Disconnection	9,992,888	\$146,598
Bill Payment Problem but No Service Disconnection	702,183	\$51,816
Bill Payment Problem and Service Disconnection	81,528	\$55,989

SOURCE: 2004 SIPP Panel

Table 5.7 repeats the same analysis for non-elderly households. Table 5.7 shows that, similar to elderly households, non-elderly low income households that experienced a bill payment problem and/or a service disconnection in the past 12 months have significantly lower net worth than those that did not experience any of the problems. However, among those non-elderly households that had a bill payment problem, the households that had their service disconnected had higher net worth than those that did not. A comparison of Table 5.6 and 5.7 shows that elderly low income households, on average, have higher total net worth than non-elderly households in each subgroup.

Table 5.7. Average Net Worth for Non-Elderly Low Income Households

Group	Number of Households	Mean Net Worth
No Bill Payment Problem and No Service Disconnection	14,865,064	\$77,047
Bill Payment Problem but No Service Disconnection	4,245,224	\$19,434
Bill Payment Problem and Service Disconnection	989,612	\$41,522

SOURCE: 2004 SIPP Panel

The tabulations show how the incidences of bill payment problems and service disconnections vary for key population subgroups. However, these tabulations cannot control for all factors at the same time. For example, Table 5.5 showed that elderly low income households are less likely to have bill payment problems than other types of households. Tables 5.6 and 5.7 showed that households that had energy affordability problems have lower total net worth than those that did not. Since elderly households, on average, have higher total net worth than non-elderly, the tabular analysis is unable to ascertain whether, in fact, the differences between elderly and nonelderly households are due to the higher total net worth of elderly low income households, or due to other factors.

To examine these issues, this study used multiple regression analysis to examine the effects of factors such as Census region, household poverty level, presence of an elderly or young child in the household, and household net worth on energy affordability problems of low income households. Multiple regression analysis allows one to discriminate between the effects of the explanatory variables, allowing for the fact that they may be correlated. The regression coefficient of each explanatory variable provides an estimate of its influence on the likelihood of energy affordability problems, controlling for the effects of all the other explanatory variables included in the model.

The multivariate analysis shows that, after controlling for Census region, household poverty level, and State fixed effects⁴⁷, elderly low income households experience significantly lower rates of energy bill payment problems and service disconnections. When household net worth is added to the regression model, the effect of being elderly on the likelihood of having energy bill payment problems and service disconnections decreases only slightly, and remains statistically significant.

The multivariate analysis of the SIPP data also shows that, similar to the findings from the 2005 RECS, household poverty level is a significant predictor of household energy affordability problems.

Analysis of Income Dynamics

The study hypothesized that low income households with volatile monthly income are more likely to experience bill payment problems than households with non-volatile income. Moreover, non-elderly households are more likely to have volatile income than elderly households.

For the purpose of the study, a household is considered to have volatile income if, in the last twelve months, the maximum difference in income between any two months is greater than 50 percent or a household has zero income in one month and non-zero income in another month. Table 5.8 presents information on the number and percent of elderly and non-elderly low income households that have volatile income. The table shows that while about 34 percent of elderly low income households have volatile income, 69 percent of non-elderly low income households have volatile income.

⁴⁷ State fixed effects are controlled for by adding State indicator variables to the regression model. State fixed effects can be interpreted as any unmeasured characteristic of a given State that leads the State to have a particular level of bill payment issues and/or service disconnections that does not vary over time. These indicator variables capture fixed differences in bill payment issues and/or service disconnections across States.

Table 5.8. Having Volatile Income for Elderly and Non-Elderly Low Income Households

	Elderly	Non-Elderly
Number of households with volatile Income	3,751,995	13,667,219
Percent of households with volatile Income	33.9%	69.0%

SOURCE: 2004 SIPP Panel

An indicator variable for having volatile income is added to the multiple regression model that includes census region indicators, household poverty level, household net worth, and State indicator variables. The findings from the regression analysis show that, controlling for other explanatory factors, households with volatile income are more likely to have bill payment problems. However, having volatile income does not have a statistically significant effect on the likelihood of service disconnections. Moreover, when a volatile income indicator is added to the regression model, the effect of being elderly on the likelihood of having energy bill payment problems decreases further but only slightly, and continues to be statistically significant.

The multivariate analysis findings on elderly households indicate that while income dynamics and household net worth explain some of the difference between elderly and non-elderly households, there is still some significant difference that is left unexplained by the variables included in the model. There might be some other observable and unobservable factors that could explain the difference between elderly and non-elderly households.

It is important to note that the variables included in the regression model explain the variation in bill payment problems better than the variation in the service disconnections. This may be due to the fact the States and utilities may have different rules and regulations related to service disconnections and household financial characteristics may not be the factor that determines whether the households receives a service shutoff if it has bill payment problems.

Analysis of energy affordability problems by income group

For fiscal year 2009, the Congress raised the Federal maximum LIHEAP income standard to the greater of 75% State median income or 150% of HHS Poverty Guidelines from the greater of 60% State median income or 150% of HHS Poverty Guidelines. The 2005 RECS Energy Insecurity questions, funded by OCS, were administered only to the respondents that were income eligible for LIHEAP according to the Federal maximum LIHEAP income standard in 2005. Therefore, the 2005 RECS Energy Insecurity questions cannot provide information on households that are newly made income eligible for LIHEAP by the change in the law.

The SIPP adult well-being questions, on the other hand, were administered to all survey respondents. Therefore, SIPP can provide information on energy affordability problems for those newly income eligible households and for households that have income above 75% State median income but at or below 100% of State median income. The information on the latter group of households is of particular interest to OCS, as OCS recently funded a series of Energy Insecurity questions in the 2009 RECS to be administered to a subsample of RECS households with income at or below 100% State median income.

Using the SIPP data, the study analyzed the bill payment problems and energy service disruptions for those households with income above the old Federal maximum LIHEAP income standard but at or

below 75% of State median income, and those with income above 75% of State median income but at or below 100% of State median income.

Table 5.9 presents information on the number of households having energy affordability problems by income group. According to the SIPP, an additional 10.6 million households are, under the Federal maximum LIHEAP income standard, made income eligible for LIHEAP by the increase in that standard. The table shows that there are about 2.7 million households with income at or below poverty that had bill payment problems. Nearly 600 thousand of such households experienced a service disconnection. There are about 1.3 million households with income above 60% but at or below 75% of State median income that had bill payment problems. Nearly 250 thousand of such households experienced a service disconnection.

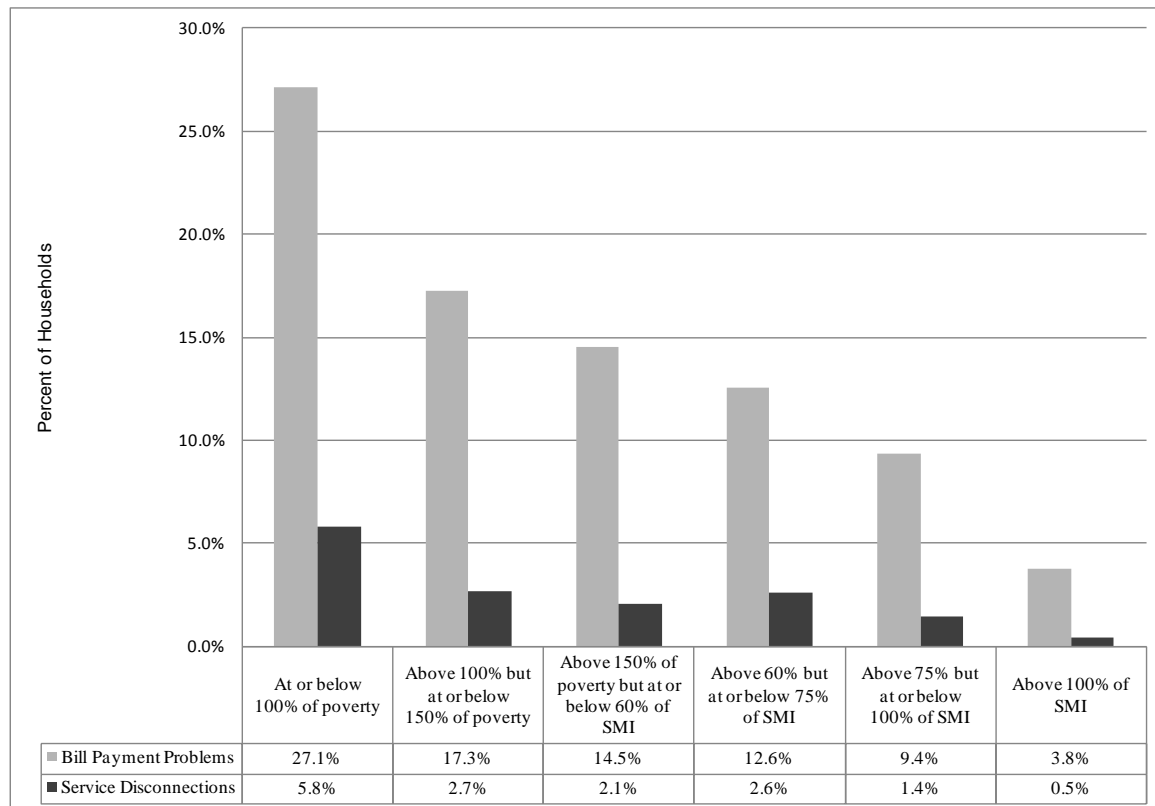
Table 5.9. Number of Households Having Energy Affordability Problems by Income Group, 2005

Income Group	Total Number of Households	Number of Households with Bill Payment Problems	Number of Households with Service Disconnections
<=100% of poverty	9,873,658	2,678,410	574,757
100% <income<=150% of poverty	10,621,868	1,834,904	282,926
150% of poverty <income<=60% of SMI	10,380,973	1,505,233	213,457
60% <income<=75% of SMI	10,614,062	1,333,995	277,079
75% <income<=100% of SMI	16,519,242	1,547,162	238,407
Income>100% SMI	53,848,966	2,024,450	242,034

SOURCE: 2004 SIPP Panel

Figure 5.1 shows the percentage of households having bill payment problems and service disconnections by income group. It is clear from the figure that as the household income increases, the likelihood of having bill payment problems decreases. For example, while 27.1% of the households with income at or below HHS Poverty Guidelines (“poverty”) reported having bill payment problems, only about 3.8% of households with income above the State median income reported that. Similarly, the higher the household income, the lower is the incidence of service disconnections. However, it is interesting to note that households with income above the Federal income standard but at or below 75% of the State median income experienced a slightly higher rate of service disconnections (2.6%) than households with income above 150% of poverty but at or below the 60% of the State median income (2.1%). This may be due to the fact the former group of households was not, under the Federal maximum LIHEAP income standard, income eligible for LIHEAP at the time of the SIPP survey but the latter group was.

Figure 5.1. Energy Affordability Problems by Income Group, SIPP, 2005



SOURCE: 2004 SIPP Panel

Study implications

OCS funded this study to analyze energy affordability problems for low income households using the 2005 SIPP data and compare the SIPP findings with those of the 2005 RECS to assess the consistency findings between the two surveys. The study also included a special analysis of household net worth and income dynamics and a special analysis of income groups that could not be performed using the RECS data.

The study answers many of the following important questions posed by OCS at the beginning of the study:

Question #1 – Are the SIPP and RECS findings consistent for the level and type of energy affordability problems among low income households?

Answer – No. The study found that while there are some similarities in the findings from the RECS and the SIPP, there are also some important differences in the incidence of energy bill payment problems and energy service disconnections between the geographic and demographic subgroups that the study looked at. One major difference between the SIPP and RECS findings is that SIPP not only shows a lower overall incidence of bill payment problems and energy service disconnections for low income households but also a consistently lower incidence of such problems for every subgroup that the study analyzed.

Question #2 – Are the SIPP and RECS findings consistent for the rate of energy affordability problems for elderly vs. non-elderly households?

Answer – Yes. The tabulations of both the 2005 SIPP and 2005 RECS data showed that elderly low income households were less likely to experience energy affordability problems than other types of low income households.

Question #3 – *Are low income households with net worth and/or stable income less likely to experience energy affordability problems?*

Answer – Yes. The data tabulations from the SIPP showed that households with higher net worth and/or more stable income were less likely to have energy affordability problems.

Question #4 – *Do elderly low income households have more net worth and/or more stable income than other types of households?*

Answer – Yes. The data tabulations from the SIPP indicated that elderly households had more net worth and more stable monthly income than non-elderly households.

Question #5 – *Do income dynamics and household net worth explain the differences between elderly and non-elderly households?*

Answer – No. The multivariate analysis of income dynamics and household net worth showed that while income dynamics and household net worth explain some of the difference between elderly and non-elderly households, there is still some significant difference that is left unexplained by the variables included in the model. There might be some other observable and/or unobservable factors that could explain the difference between elderly and non-elderly households. Further research is needed to identify such factors.

Question #6 – *What is the incidence of energy affordability problems for the group of households that are made income-eligible for LIHEAP by the increase of Federal maximum LIHEAP Income standard for FY 2009?*

Answer – According to the SIPP, there are an additional 10.6 million households that are made income eligible for LIHEAP, under the Federal maximum LIHEAP income standard, by the increase in the Federal maximum LIHEAP income standard for FY 2009. There are about 1.3 million households with income above 60% but at or below 75% of State median income that had bill payment problems. Nearly 250 thousand such households experienced a service disconnection.

The analysis of the SIPP data confirmed that elderly low income households are less likely to have bill payment problems and/or experience service disconnections than non-elderly low income households. The differences between elderly and non-elderly households could not explained by differences in household net worth or income stability. One alternative to investigate the issue further would be to use the data from the Consumption Expenditure Survey (CE) to study the choices elderly and nonelderly households make when they have competing demands on household income. The CE, however, cannot furnish information on energy service disconnections, as there is no question on the survey that collects such information.

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 2009. 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.⁴⁸

The 2005 RECS is the twelfth survey in the series of surveys.⁴⁹ For the 2005 RECS, 4,382 households were interviewed, including 434 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 2009.

⁴⁸Regression 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).

⁴⁹For 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:⁵⁰

- The 2005 RECS data for calendar year 2005 were updated to FY 2009 (October 1, 2008 to September 30, 2009), using procedures that adjust the 2005 data to reflect the weather and fuel prices for FY 2009. These procedures are comparable to those used for the FY 1986 - FY 2008 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

⁵⁰Information 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 2009 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 2009 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 2009 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.⁵¹

⁵¹More 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.⁵² 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.⁵³ 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.⁵⁴ 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

⁵²The mean is the sum of all values divided by the number of values. The mean is also referred to as the average.

⁵³For 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.

⁵⁴For 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.

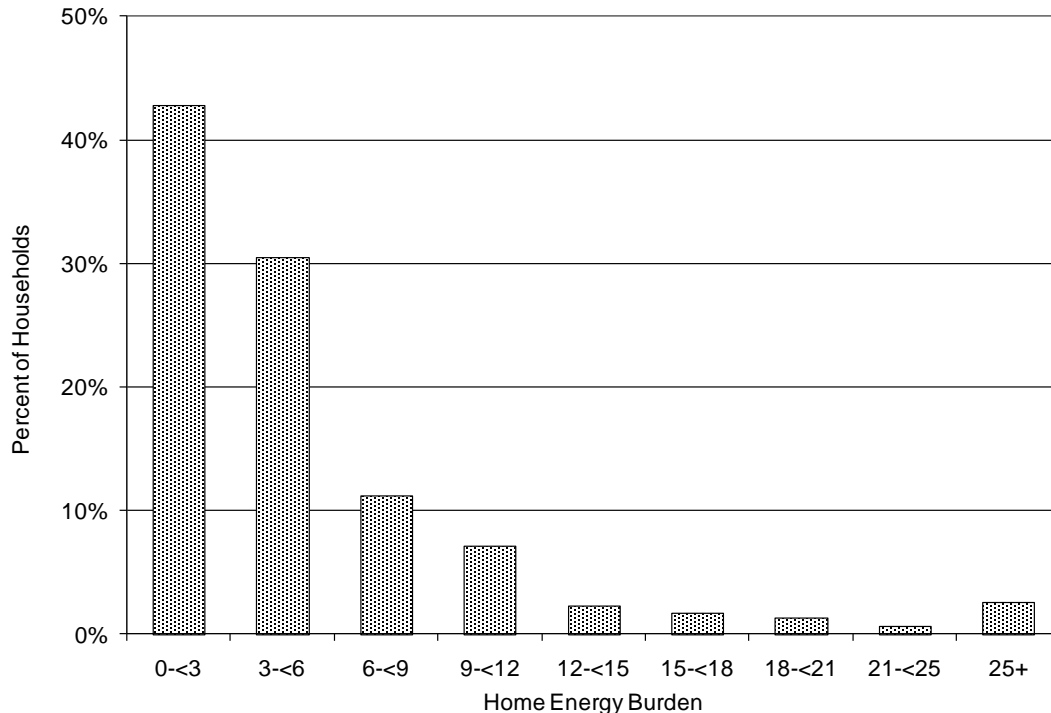
energy burden ratios. Figure A-1 demonstrates a skewed distribution of LIHEAP income eligible households by home energy burden.

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, the RECS collects income data less precisely through the use of income intervals. Finally, the CPS ASEC collects income more precisely by asking a series of detailed questions on income than the RECS does and also has a larger sample size than the RECS.

The RECS, which categorizes more households as income eligible for LIHEAP than the CPS ASEC, thus categorizes too many households as income eligible for LIHEAP. Based on the 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.⁵⁵

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.

⁵⁵The 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*, the mean individual energy burden and mean group burden statistics have been furnished in the reports. Previous reports to Congress presented only the mean group burden. The text of this *Notebook* references mean group burden to maintain consistency with the previous reports to Congress.

Projecting energy consumption and expenditures

Projections were developed using microsimulation techniques that adjusted consumption and energy expenditures for changes in weather and prices. Consumption amounts for each household were adjusted for changes in heating and cooling degree days. Projected expenditures for each household

were estimated as a function of projected consumption changes and actual changes in fuel prices. In order to make these projections, it was assumed that households did not change their energy use behavior (that is, their tendency to seek a specific indoor temperature) as a result of weather, price, or other changes.

Consumption projections utilized end use consumption estimates that were developed with the 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 2009. The following equation was applied to each household in the microsimulation data file.

$$\text{FY 2009 Projected BTUs} = (2005 \text{ estimated heat use} * \text{HDD change}) + (2005 \text{ estimated cooling use} * \text{CDD change}) + (2005 \text{ estimated water use} + 2005 \text{ estimated appliance use})$$

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

$$\text{Preliminary Expenditures} = 2005 \text{ Expenditures} * (\text{FY 2009 Projected Usage} / 2005 \text{ Actual Usage})$$

$$\text{Final Expenditures} = \text{Preliminary Expenditures} * \text{Price Change}^{56}$$

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 2009. For example, electricity prices increased by almost 18 percent from 2005 to FY 2009.

Table A-1. National price factors for FY 2009

Fuel	Price Factors for FY 2009 Projections
Electricity	1.2234
Natural gas	1.0857
Fuel oil / kerosene	1.2807
Liquefied petroleum gas (LPG)	1.1780

Expenditure data were adjusted using national price factors for FY 2009. 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

⁵⁶Price factors were developed using price data obtained from the Energy Information Administration's Monthly Energy Review, September 2010, 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, September 2010.

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 2009^{1/}

	All Fuels ^{2/}	Natural Gas	Electricity	Fuel Oil	Kerosene	LPG
(In MmBTUs) ^{3/}						
United States						
All households	97.8	114.0	61.1	152.7	55.1	110.6
Non low income households	103.8	118.5	65.8	161.8	62.2*	118.1
Low income households ^{4/}	86.5	104.5	53.0	138.8	53.8	96.3
LIHEAP recipient households ^{5/}	106.7	117.2	49.4	157.1	78.3*	109.1
Northeast						
All households	126.2	125.6	48.2	156.9	38.8	128.9
Non low income households	137.4	134.7	53.7	168.4	65.2*	139.7
Low income households	109.3	110.4	41.9	140.1	34.4*	100.9*
LIHEAP recipient households	121.5	113.8	48.7	157.6	77.0*	84.7*
Midwest						
All households	119.1	131.5	59.4	132.0	91.6*	129.9
Non low income households	124.8	135.8	65.3	139.0	NC	131.6
Low income households	109.5	124.0	52.0	123.2	91.6*	123.4
LIHEAP recipient households	123.6	136.5	48.8	154.7*	89.7*	106.4*
South						
All households	81.7	110.0	63.1	132.8	54.0	98.7
Non low income households	88.5	116.5	68.0	130.8	61.3*	105.2
Low income households	68.8	93.9	54.0	137.2*	51.9	90.6
LIHEAP recipient households	88.3	107.4	50.1	147.7*	77.3*	115.3*
West						
All households	77.9	86.7	58.1	149.9	59.6*	98.4
Non low income households	83.4	91.3	60.7	144.0*	NC	106.7
Low income households	65.2	72.7	54.1	181.4*	59.6*	84.4
LIHEAP recipient households	68.7	76.6	49.2	165.6*	NC	112.8*

^{1/}Developed from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy, and adjusted for FY 2009 for heating and cooling degree days.

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

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

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

^{5/}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 2009

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars ^{1/}	Percent ^{2/}	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States												
All households	\$2,180	3.2%	\$2,148	3.1%	\$1,868	2.7%	\$3,496	5.1%	\$1,521	2.2%	\$2,945	4.3%
Non low income households	\$2,339	2.6%	\$2,303	2.6%	\$2,013	2.2%	\$3,757	4.2%	\$1,549*	1.7%	\$3,058	3.4%
Low income households ^{3/}	\$1,885	10.4%	\$1,822	10.0%	\$1,623	8.9%	\$3,096	17.0%	\$1,515	8.3%	\$2,731	15.0%
LIHEAP recipient households ^{4/}	\$2,087	13.4%	\$1,961	12.6%	\$1,337	8.6%	\$3,532	22.7%	\$1,758*	11.3%	\$3,298	21.2%
Northeast												
All households	\$2,756	3.7%	\$2,448	3.3%	\$1,794	2.4%	\$3,639	4.8%	\$1,193	1.6%	\$3,698	4.9%
Non low income households	\$3,024	3.0%	\$2,689	2.7%	\$1,869	1.8%	\$3,974	3.9%	\$2,334*	2.3%	\$3,754	3.7%
Low income households	\$2,351	11.9%	\$2,047	10.3%	\$1,708	8.6%	\$3,151	15.9%	\$1,003*	5.1%	\$3,551*	17.9%
LIHEAP recipient households	\$2,582	15.4%	\$2,134	12.8%	\$1,621	9.7%	\$3,589	21.5%	\$2,068*	12.4%	\$2,437*	14.6%
Midwest												
All households	\$2,125	3.3%	\$2,131	3.3%	\$1,461	2.2%	\$2,932	4.5%	\$1,944*	3.0%	\$3,169	4.9%
Non low income households	\$2,261	2.7%	\$2,243	2.6%	\$1,604	1.9%	\$3,197	3.8%	NC	NC	\$3,161	3.7%
Low income households	\$1,894	10.3%	\$1,939	10.5%	\$1,283	7.0%	\$2,596	14.1%	\$1,944*	10.5%	\$3,198	17.3%
LIHEAP recipient households	\$2,000	12.9%	\$2,069	13.4%	\$1,256	8.1%	\$3,076*	19.9%	\$1,631*	10.5%	\$2,831*	18.3%
South												
All households	\$2,152	3.4%	\$2,338	3.7%	\$1,995	3.2%	\$2,761	4.4%	\$1,601	2.5%	\$2,741	4.3%
Non low income households	\$2,306	2.8%	\$2,522	3.0%	\$2,124	2.6%	\$2,577	3.1%	\$1,291*	1.6%	\$2,842	3.4%
Low income households	\$1,858	11.2%	\$1,883	11.3%	\$1,751	10.5%	\$3,164*	19.1%	\$1,688	10.2%	\$2,614	15.7%
LIHEAP recipient households	\$2,029	16.0%	\$1,979	15.6%	\$1,441	11.4%	\$3,276*	25.8%	\$1,704*	13.4%	\$3,722*	29.4%
West												
All households	\$1,794	2.4%	\$1,759	2.3%	\$1,670	2.2%	\$3,128	4.2%	\$1,399*	1.9%	\$2,748	3.7%
Non low income households	\$1,964	2.0%	\$1,922	2.0%	\$1,835	1.9%	\$3,117*	3.2%	NC	NC	\$2,983	3.1%
Low income households	\$1,402	7.3%	\$1,272	6.6%	\$1,409	7.3%	\$3,189*	16.6%	\$1,399*	7.3%	\$2,351	12.2%
LIHEAP recipient households	\$1,300	7.3%	\$1,219	6.9%	\$1,096	6.2%	\$3,043*	17.2%	NC	NC	\$2,988*	16.9%

^{1/}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 2009. 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.

^{2/}Represents the percent of household's income used for residential energy expenditures. National and regional mean incomes are calculated from the 2009 CPS ASEC, which reports income for calendar year 2008. Mean group residential burden is computed as mean group energy expenditures (from RECS) divided by mean group income (from CPS ASEC). See text in Appendix A for a discussion of energy burden.

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

^{4/}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 2009

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars ^{1/}	Percent ^{2/}	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States												
All households	\$2,180	7.2%	\$2,148	6.4%	\$1,868	7.1%	\$3,496	12.2%	\$1,521	9.8%	\$2,945	9.7%
Non low income households	\$2,339	3.6%	\$2,303	3.5%	\$2,013	3.3%	\$3,757	5.5%	\$1,549*	4.3%	\$3,058	5.2%
Low income households ^{3/}	\$1,885	13.8%	\$1,822	12.5%	\$1,623	13.4%	\$3,096	22.4%	\$1,515	10.8%	\$2,731	18.2%
LIHEAP recipient households ^{4/}	\$2,087	16.4%	\$1,961	15.0%	\$1,337	15.2%	\$3,532	24.9%	\$1,758*	18.9%	\$3,298	17.9%
Northeast												
All households	\$2,756	9.0%	\$2,448	7.3%	\$1,794	7.7%	\$3,639	12.6%	\$1,193	9.7%	\$3,698	10.4%
Non low income households	\$3,024	4.4%	\$2,689	4.0%	\$1,869	3.0%	\$3,974	5.5%	\$2,334*	4.4%	\$3,754	5.4%
Low income households	\$2,351	16.0%	\$2,047	12.8%	\$1,708	12.9%	\$3,151	22.9%	\$1,003*	10.5%	\$3,551*	23.3%
LIHEAP recipient households	\$2,582	18.0%	\$2,134	14.2%	\$1,621	17.2%	\$3,589	24.4%	\$2,068*	26.2%	\$2,437*	12.2%
Midwest												
All households	\$2,125	7.1%	\$2,131	7.3%	\$1,461	5.8%	\$2,932	10.9%	\$1,944*	8.5%	\$3,169	7.1%
Non low income households	\$2,261	3.5%	\$2,243	3.5%	\$1,604	2.9%	\$3,197	5.3%	NC	NC	\$3,161	4.7%
Low income households	\$1,894	13.3%	\$1,939	14.0%	\$1,283	9.3%	\$2,596	17.9%	\$1,944*	8.5%	\$3,198	16.3%
LIHEAP recipient households	\$2,000	17.9%	\$2,069	17.4%	\$1,256	20.3%	\$3,076*	27.8%	\$1,631*	6.5%	\$2,831*	14.5%
South												
All households	\$2,152	7.7%	\$2,338	6.7%	\$1,995	7.6%	\$2,761	11.5%	\$1,601	10.6%	\$2,741	11.8%
Non low income households	\$2,306	3.9%	\$2,522	4.0%	\$2,124	3.6%	\$2,577	5.6%	\$1,291*	4.3%	\$2,842	6.1%
Low income households	\$1,858	15.1%	\$1,883	13.6%	\$1,751	15.2%	\$3,164*	24.5%	\$1,688	12.3%	\$2,614	19.0%
LIHEAP recipient households	\$2,029	16.9%	\$1,979	14.8%	\$1,441	16.4%	\$3,276*	37.9%	\$1,704*	18.7%	\$3,722*	22.3%
West												
All households	\$1,794	4.9%	\$1,759	4.1%	\$1,670	5.8%	\$3,128	7.4%	\$1,399*	7.2%	\$2,748	8.8%
Non low income households	\$1,964	2.8%	\$1,922	2.7%	\$1,835	2.6%	\$3,117*	5.0%	NC	NC	\$2,983	4.5%
Low income households	\$1,402	9.8%	\$1,272	8.3%	\$1,409	10.8%	\$3,189*	20.4%	\$1,399*	7.2%	\$2,351	16.0%
LIHEAP recipient households	\$1,300	8.8%	\$1,219	9.4%	\$1,096	8.1%	\$3,043*	3.1%	NC	NC	\$2,988*	9.4%

^{1/}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 2009. 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.

^{2/}Represents the percent of household income used for residential energy expenditures. For individual households, FY 2009 income is estimated by inflating income reported in the 2005 RECS by the consumer price index (CPI) and FY 2009 energy expenditures are estimated by adjusting energy expenditures reported in the 2005 RECS for changes in weather and energy prices. FY 2009 residential energy burden for each household is computed as estimated FY 2009 residential energy expenditures divided by estimated FY 2009 annual income. Mean individual residential burden is computed by computing the mean of the individual values. See text in Appendix A for a discussion of energy burden.

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

^{4/}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 2009

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars ^{1/}	Percent ^{2/}	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States												
All households	\$2,180	4.4%	\$2,148	4.0%	\$1,868	4.1%	\$3,496	7.3%	\$1,521	7.0%	\$2,945	6.6%
Non low income households	\$2,339	3.1%	\$2,303	3.0%	\$2,013	3.0%	\$3,757	4.9%	\$1,549*	4.8%	\$3,058	4.7%
Low income households ^{3/}	\$1,885	9.6%	\$1,822	9.0%	\$1,623	8.4%	\$3,096	16.0%	\$1,515	8.8%	\$2,731	14.5%
LIHEAP recipient households ^{4/}	\$2,087	10.8%	\$1,961	10.6%	\$1,337	9.4%	\$3,532	24.1%	\$1,758*	14.1%	\$3,298	11.2%
Northeast												
All households	\$2,756	5.4%	\$2,448	4.6%	\$1,794	4.5%	\$3,639	7.3%	\$1,193	8.8%	\$3,698	6.3%
Non low income households	\$3,024	3.9%	\$2,689	3.4%	\$1,869	2.7%	\$3,974	4.9%	\$2,334*	4.1%	\$3,754	5.6%
Low income households	\$2,351	10.9%	\$2,047	9.4%	\$1,708	8.3%	\$3,151	15.7%	\$1,003*	8.8%	\$3,551*	22.3%
LIHEAP recipient households	\$2,582	11.7%	\$2,134	7.8%	\$1,621	12.0%	\$3,589	24.1%	\$2,068*	15.2%	\$2,437*	10.2%
Midwest												
All households	\$2,125	4.4%	\$2,131	4.4%	\$1,461	4.0%	\$2,932	7.3%	\$1,944*	6.6%	\$3,169	4.7%
Non low income households	\$2,261	3.0%	\$2,243	3.0%	\$1,604	2.4%	\$3,197	4.4%	NC	NC	\$3,161	4.4%
Low income households	\$1,894	10.2%	\$1,939	10.2%	\$1,283	7.0%	\$2,596	16.5%	\$1,944*	6.6%	\$3,198	16.7%
LIHEAP recipient households	\$2,000	11.3%	\$2,069	11.5%	\$1,256	10.6%	\$3,076*	28.5%	\$1,631*	6.5%	\$2,831*	19.0%
South												
All households	\$2,152	4.7%	\$2,338	4.6%	\$1,995	4.4%	\$2,761	7.3%	\$1,601	7.0%	\$2,741	8.3%
Non low income households	\$2,306	3.4%	\$2,522	3.4%	\$2,124	3.2%	\$2,577	5.9%	\$1,291*	5.2%	\$2,842	5.5%
Low income households	\$1,858	10.1%	\$1,883	10.5%	\$1,751	9.4%	\$3,164*	17.4%	\$1,688	9.7%	\$2,614	14.5%
LIHEAP recipient households	\$2,029	14.2%	\$1,979	15.3%	\$1,441	9.6%	\$3,276*	45.2%	\$1,704*	14.1%	\$3,722*	20.1%
West												
All households	\$1,794	3.0%	\$1,759	2.8%	\$1,670	3.1%	\$3,128	5.2%	\$1,399*	7.7%	\$2,748	5.4%
Non low income households	\$1,964	2.3%	\$1,922	2.3%	\$1,835	2.3%	\$3,117*	5.2%	NC	NC	\$2,983	3.9%
Low income households	\$1,402	6.3%	\$1,272	6.0%	\$1,409	6.0%	\$3,189*	23.2%	\$1,399*	7.7%	\$2,351	10.8%
LIHEAP recipient households	\$1,300	8.0%	\$1,219	8.2%	\$1,096	8.0%	\$3,043*	3.1%	NC	NC	\$2,988*	5.0%

^{1/}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 2009. 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.

^{2/}Represents the percent of household income used for residential energy expenditures. For individual households, FY 2009 income is estimated by inflating income reported in the 2005 RECS by the consumer price index (CPI) and FY 2009 energy expenditures are estimated by adjusting energy expenditures reported in the 2005 RECS for changes in weather and energy prices. FY 2009 residential energy burden for each household is computed as estimated FY 2009 residential energy expenditures divided by estimated FY 2009 annual income. Median individual residential burden is computed by computing the median of the individual values.

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

^{4/}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^{1/}

	Natural Gas ^{2/}	Electricity	Fuel Oil	Kerosene	LPG	Other ^{3/}
United States						
All households	52.6%	30.1%	6.9%	0.6%	5.5%	3.2%
Non low income households	55.1%	29.2%	6.5%	0.1%	5.5%	2.9%
Low income households ^{4/}	48.1%	31.8%	7.8%	1.5%	5.4%	3.7%
LIHEAP recipient households ^{5/}	60.0%	19.0%	12.0%	2.4%	5.2%	1.2%
Northeast						
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%
Midwest						
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%
South						
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%
West						
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%

^{1/}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.

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

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

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

^{5/} 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 2009^{1/}

	All Fuels ^{2/}	Natural Gas	Electricity	Fuel Oil	Kerosene	LPG
(In MmBTUs) ^{3/}						
United States						
All households	41.7	54.0	9.0	102.9	21.8	55.0
Non low income households	42.8	53.4	9.6	106.6	26.8*	61.0
Low income households ^{4/}	39.7	55.4	8.1	97.2	20.9	43.7
LIHEAP recipient households ^{5/}	57.1	66.3	9.2	104.4	26.2*	46.9
Northeast						
All households	75.3	72.2	13.4	104.8	16.7	80.5
Non low income households	80.2	75.0	14.5	110.5	24.2*	87.8
Low income households	67.9	67.7	12.2	96.5	15.5*	61.7*
LIHEAP recipient households	73.7	68.6	12.3	102.0	16.8*	50.0*
Midwest						
All households	63.7	73.5	15.3	89.0	49.8*	71.3
Non low income households	65.1	73.9	17.2	80.7	NC	74.1
Low income households	61.1	72.9	12.9	99.5	49.8*	61.0
LIHEAP recipient households	71.0	80.4	11.8	130.7*	5.4*	59.3*
South						
All households	22.0	38.7	8.1	98.7	18.2	44.5
Non low income households	23.3	39.4	8.8	101.6	27.7*	45.7
Low income households	19.4	36.8	6.9	92.5*	15.5	43.1
LIHEAP recipient households	35.5	51.3	7.4	98.0*	30.6*	43.9*
West						
All households	23.2	29.6	7.8	102.4	18.7*	41.8
Non low income households	25.1	30.0	7.9	95.2*	NC	53.2
Low income households	19.0	28.2	7.7	140.8*	18.7*	22.4
LIHEAP recipient households	27.1	36.7	8.1	146.9*	NC	40.7*

^{1/}Developed from the 2005 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy, and adjusted for FY 2009 for heating degree days.

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

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

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

^{5/} 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 2009

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars ^{1/}	Percent ^{2/}	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States												
All households	\$631	0.9%	\$648	0.9%	\$284	0.4%	\$1,804	2.6%	\$377	0.6%	\$1,289	1.9%
Non low income households	\$648	0.7%	\$646	0.7%	\$299	0.3%	\$1,875	2.1%	\$447*	0.5%	\$1,382	1.5%
Low income households ^{3/}	\$600	3.3%	\$653	3.6%	\$257	1.4%	\$1,695	9.3%	\$364	2.0%	\$1,114	6.1%
LIHEAP recipient households ^{4/}	\$816	5.2%	\$785	5.0%	\$275	1.8%	\$1,823	11.7%	\$415*	2.7%	\$1,189	7.6%
Northeast												
All households	\$1,169	1.6%	\$939	1.3%	\$532	0.7%	\$1,833	2.4%	\$287	0.4%	\$1,804	2.4%
Non low income households	\$1,245	1.2%	\$991	1.0%	\$504	0.5%	\$1,940	1.9%	\$440*	0.4%	\$1,865	1.8%
Low income households	\$1,053	5.3%	\$853	4.3%	\$564	2.8%	\$1,676	8.5%	\$261*	1.3%	\$1,645*	8.3%
LIHEAP recipient households	\$1,130	6.8%	\$850	5.1%	\$468	2.8%	\$1,778	10.6%	\$252*	1.5%	\$1,308*	7.8%
Midwest												
All households	\$827	1.3%	\$835	1.3%	\$396	0.6%	\$1,567	2.4%	\$905*	1.4%	\$1,532	2.4%
Non low income households	\$855	1.0%	\$842	1.0%	\$441	0.5%	\$1,426	1.7%	NC	NC	\$1,559	1.8%
Low income households	\$779	4.2%	\$823	4.5%	\$339	1.8%	\$1,746	9.5%	\$905*	4.9%	\$1,434	7.8%
LIHEAP recipient households	\$868	5.6%	\$911	5.9%	\$320	2.1%	\$2,319*	15.0%	\$66*	0.4%	\$1,313*	8.5%
South												
All households	\$413	0.7%	\$493	0.8%	\$262	0.4%	\$1,773	2.8%	\$303	0.5%	\$1,138	1.8%
Non low income households	\$430	0.5%	\$505	0.6%	\$281	0.3%	\$1,807	2.2%	\$449*	0.5%	\$1,148	1.4%
Low income households	\$381	2.3%	\$462	2.8%	\$226	1.4%	\$1,700*	10.2%	\$262	1.6%	\$1,125	6.8%
LIHEAP recipient households	\$600	4.7%	\$683	5.4%	\$213	1.7%	\$1,713*	13.5%	\$490*	3.9%	\$1,193*	9.4%
West												
All households	\$334	0.4%	\$330	0.4%	\$238	0.3%	\$1,822	2.4%	\$329*	0.4%	\$1,023	1.4%
Non low income households	\$358	0.4%	\$338	0.3%	\$255	0.3%	\$1,707*	1.7%	NC	NC	\$1,282	1.3%
Low income households	\$278	1.4%	\$308	1.6%	\$212	1.1%	\$2,438*	12.7%	\$329*	1.7%	\$585	3.0%
LIHEAP recipient households	\$380	2.1%	\$386	2.2%	\$228	1.3%	\$2,553*	14.4%	NC	NC	\$875*	4.9%

^{1/}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 2009. 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.

^{2/}Represents the percent of household income used for home heating energy expenditures. National and regional mean incomes are calculated from the 2009 CPS ASEC, which reports income for calendar year 2008. Mean group home heating burden is computed as mean group energy expenditures (from RECS) divided by mean group income (from CPS ASEC). See Appendix A for a discussion of energy burden.

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

^{4/}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 2009

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars ^{1/}	Percent ^{2/}	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States												
All households	\$631	2.3%	\$648	2.3%	\$284	1.2%	\$1,804	7.3%	\$377	2.2%	\$1,289	4.3%
Non low income households	\$648	1.1%	\$646	1.0%	\$299	0.5%	\$1,875	2.9%	\$447*	1.4%	\$1,382	2.4%
Low income households ^{3/}	\$600	4.7%	\$653	4.9%	\$257	2.2%	\$1,695	14.1%	\$364	2.4%	\$1,114	8.0%
LIHEAP recipient households ^{4/}	\$816	6.9%	\$785	6.9%	\$275	3.8%	\$1,823	12.7%	\$415*	4.2%	\$1,189	7.6%
Northeast												
All households	\$1,169	4.4%	\$939	3.1%	\$532	2.9%	\$1,833	7.5%	\$287	2.1%	\$1,804	5.3%
Non low income households	\$1,245	1.9%	\$991	1.6%	\$504	0.9%	\$1,940	2.8%	\$440*	0.8%	\$1,865	2.8%
Low income households	\$1,053	8.1%	\$853	5.7%	\$564	5.2%	\$1,676	14.3%	\$261*	2.3%	\$1,645*	11.8%
LIHEAP recipient households	\$1,130	8.0%	\$850	6.2%	\$468	5.9%	\$1,778	11.8%	\$252*	3.1%	\$1,308*	6.9%
Midwest												
All households	\$827	3.1%	\$835	3.3%	\$396	1.6%	\$1,567	6.8%	\$905*	3.9%	\$1,532	3.5%
Non low income households	\$855	1.4%	\$842	1.4%	\$441	0.8%	\$1,426	2.6%	NC	NC	\$1,559	2.3%
Low income households	\$779	6.1%	\$823	6.7%	\$339	2.6%	\$1,746	12.0%	\$905*	3.9%	\$1,434	7.9%
LIHEAP recipient households	\$868	8.9%	\$911	9.2%	\$320	5.8%	\$2,319*	21.1%	\$66*	0.3%	\$1,313*	7.4%
South												
All households	\$413	1.6%	\$493	1.6%	\$262	1.0%	\$1,773	7.0%	\$303	2.0%	\$1,138	5.3%
Non low income households	\$430	0.8%	\$505	0.9%	\$281	0.5%	\$1,807	4.0%	\$449*	1.6%	\$1,148	2.5%
Low income households	\$381	3.1%	\$462	3.5%	\$226	2.0%	\$1,700*	13.5%	\$262	2.1%	\$1,125	8.7%
LIHEAP recipient households	\$600	5.3%	\$683	5.3%	\$213	3.1%	\$1,713*	20.1%	\$490*	4.9%	\$1,193*	8.9%
West												
All households	\$334	1.0%	\$330	0.8%	\$238	0.9%	\$1,822	4.9%	\$329*	1.7%	\$1,023	2.9%
Non low income households	\$358	0.5%	\$338	0.5%	\$255	0.4%	\$1,707*	2.9%	NC	NC	\$1,282	1.9%
Low income households	\$278	1.9%	\$308	1.9%	\$212	1.8%	\$2,438*	15.4%	\$329*	1.7%	\$585	4.7%
LIHEAP recipient households	\$380	2.5%	\$386	3.1%	\$228	1.8%	\$2,553*	2.6%	NC	NC	\$875*	3.0%

^{1/}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 2009. 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.

^{2/}Represents the percent of household income used for home heating energy expenditures. For individual households, FY 2009 income is estimated by inflating income reported in the 2005 RECS by the consumer price index (CPI) and FY 2009 energy expenditures are estimated by adjusting energy expenditures reported in the 2005 RECS for changes in weather and energy prices. FY 2009 home heating energy burden for each household is computed by computing the mean of the individual values. See text in Appendix A for a discussion of energy burden.

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

^{4/} 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 2009

Census Region	Main heating fuel											
	All fuels		Natural gas		Electricity		Fuel oil		Kerosene		LPG	
	Dollars ^{1/}	Percent ^{2/}	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
United States												
All households	\$631	1.0%	\$648	1.1%	\$284	0.6%	\$1,804	3.7%	\$377	1.7%	\$1,289	2.6%
Non low income households	\$648	0.6%	\$646	0.8%	\$299	0.4%	\$1,875	2.4%	\$447*	0.9%	\$1,382	2.0%
Low income households ^{3/}	\$600	2.3%	\$653	3.0%	\$257	1.2%	\$1,695	9.0%	\$364	1.7%	\$1,114	6.4%
LIHEAP recipient households ^{4/}	\$816	3.6%	\$785	3.7%	\$275	1.6%	\$1,823	10.2%	\$415*	4.3%	\$1,189	4.2%
Northeast												
All households	\$1,169	2.1%	\$939	1.7%	\$532	1.3%	\$1,833	3.6%	\$287	1.4%	\$1,804	3.6%
Non low income households	\$1,245	1.4%	\$991	1.2%	\$504	0.9%	\$1,940	2.4%	\$440*	0.9%	\$1,865	2.7%
Low income households	\$1,053	4.6%	\$853	3.8%	\$564	2.7%	\$1,676	8.5%	\$261*	1.4%	\$1,645*	9.2%
LIHEAP recipient households	\$1,130	5.0%	\$850	3.2%	\$468	3.5%	\$1,778	10.2%	\$252*	2.0%	\$1,308*	5.9%
Midwest												
All households	\$827	1.5%	\$835	1.6%	\$396	1.0%	\$1,567	3.7%	\$905*	2.2%	\$1,532	2.5%
Non low income households	\$855	1.1%	\$842	1.1%	\$441	0.7%	\$1,426	2.4%	NC	NC	\$1,559	2.0%
Low income households	\$779	3.7%	\$823	4.0%	\$339	1.9%	\$1,746	11.7%	\$905*	2.2%	\$1,434	8.6%
LIHEAP recipient households	\$868	4.6%	\$911	4.9%	\$320	2.4%	\$2,319*	20.2%	\$66*	0.3%	\$1,313*	10.9%
South												
All households	\$413	0.7%	\$493	0.8%	\$262	0.5%	\$1,773	5.1%	\$303	1.4%	\$1,138	3.2%
Non low income households	\$430	0.5%	\$505	0.6%	\$281	0.4%	\$1,807	4.7%	\$449*	2.4%	\$1,148	2.0%
Low income households	\$381	1.5%	\$462	2.3%	\$226	1.2%	\$1,700*	10.0%	\$262	1.4%	\$1,125	6.4%
LIHEAP recipient households	\$600	3.0%	\$683	3.8%	\$213	1.6%	\$1,713*	20.8%	\$490*	4.3%	\$1,193*	2.4%
West												
All households	\$334	0.4%	\$330	0.5%	\$238	0.4%	\$1,822	2.5%	\$329*	1.7%	\$1,023	1.8%
Non low income households	\$358	0.3%	\$338	0.3%	\$255	0.3%	\$1,707*	2.5%	NC	NC	\$1,282	1.7%
Low income households	\$278	1.0%	\$308	1.2%	\$212	0.8%	\$2,438*	17.5%	\$329*	1.7%	\$585	2.9%
LIHEAP recipient households	\$380	1.6%	\$386	2.4%	\$228	1.2%	\$2,553*	2.6%	NC	NC	\$875*	0.8%

^{1/} 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 2009. 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.

^{2/} Represents the percent of household income used for home heating energy expenditures. For individual households, FY 2009 income is estimated by inflating income reported in the 2005 RECS by the consumer price index (CPI) and FY 2009 energy expenditures are estimated by adjusting energy expenditures reported in the 2005 RECS for changes in weather and energy prices. FY 2009 home heating energy burden for each household is computed by computing the median of the individual values. See text in Appendix A for a discussion of energy burden.

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

^{4/} 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 2009

	Percent that cool ^{1/}	Consumption ^{2/} (in mmBTUs)	Expenditures ^{2/}	Mean group burden ^{3/}	Mean individual burden ^{3/}	Median individual burden ^{3/}
United States						
All households	92.1%	7.8	\$276	0.4%	1.0%	0.4%
Non low income households	93.8%	8.6	\$303	0.3%	0.5%	0.2%
Low income households ^{4/}	89.1%	6.3	\$223	1.2%	2.0%	0.7%
LIHEAP recipient households ^{5/}	85.5%	4.3	\$151	1.0%	1.1%	0.4%
Northeast						
All households	88.6%	2.5	\$117	0.2%	0.4%	0.2%
Non low income households	93.6%	2.8	\$129	0.1%	0.2%	0.1%
Low income households	81.2%	2.0	\$97	0.5%	0.8%	0.4%
LIHEAP recipient households	84.1%	2.1	\$104	0.6%	0.7%	0.3%
Midwest						
All households	96.7%	3.7	\$112	0.2%	0.4%	0.2%
Non low income households	97.3%	4.0	\$120	0.1%	0.2%	0.1%
Low income households	95.7%	3.2	\$96	0.5%	0.6%	0.4%
LIHEAP recipient households	88.8%	2.6	\$82	0.5%	0.9%	0.4%
South						
All households	98.1%	13.6	\$470	0.7%	1.9%	0.9%
Non low income households	99.4%	14.8	\$509	0.6%	0.8%	0.7%
Low income households	95.5%	11.2	\$392	2.4%	3.9%	1.9%
LIHEAP recipient households	92.1%	9.6	\$326	2.6%	2.3%	1.1%
West						
All households	80.3%	6.2	\$236	0.3%	0.6%	0.2%
Non low income households	81.7%	6.7	\$261	0.3%	0.4%	0.2%
Low income households	77.1%	4.8	\$174	0.9%	1.2%	0.4%
LIHEAP recipient households	70.5%	2.6	\$81	0.5%	0.5%	0.2%

^{1/}Cooling includes central and room air-conditioning, as well as non-air-conditioning cooling devices (e.g., ceiling fans, evaporative coolers). Excludes households that do not cool or cool in ways other than those recorded by the 2005 RECS (e.g., table and window fans.)

^{2/}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 2009. Expenditures represent billed costs for electricity used.

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

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

^{5/}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 a number of years, ACF has furnished State grantees with State level estimates of the number of LIHEAP income eligible households, including the number of vulnerable households and the number of households by poverty level. State grantees can use these estimates with their own data on LIHEAP recipient characteristics to compute target performance measurement statistics.

State-level estimates of the number of income eligible households for FY 2009 were developed using the ACS. In the previous versions of the *Notebook*, estimates of the number of income eligible households were developed from both ACS and CPS ASEC, and the results from both data sources were presented. Starting this year, only the results from ACS will be presented. The Census Bureau recommends the use of the ACS for the state-level income and poverty analysis.⁵⁷ ACF uses the estimates from the ACS and household recipient data from the States' *LIHEAP Household Report* to develop state-level targeting indexes.

The 2007-2009 ACS three-year Public Use Microdata Sample (PUMS) data are used to develop more precise estimates of the number of income eligible households than those that would have been obtained using the 2009 single-year ACS PUMS data.⁵⁸

For fiscal year 2009, the Congress raised the Federal maximum LIHEAP income standard to the greater of 75 percent State median income or 150 percent of HHS Poverty Guidelines from the greater of 60 percent State median income or 150 percent of HHS Poverty Guidelines.^{59 60} For comparison purposes, state-level estimates of the number of LIHEAP income eligible households using both the new and previous Federal maximum LIHEAP income standard are presented.

Tables B-1 through B-3 show estimates of the number of LIHEAP income eligible households by vulnerability group,⁶¹ derived from the 2007-2009 ACS, using the using the new Federal Maximum Income Standard, the previous Federal Maximum Income Standard, and the State Income Standards, respectively.

Similarly, Tables B-4 through B-6 show estimates of the number of LIHEAP income eligible households by poverty group, derived from the 2007-2009 ACS, using the using the new Federal Maximum Income Standard, the previous Federal Maximum Income Standard.

⁵⁷ For an explanation, and to better understand the differences between the two surveys, please visit "Guidance about Income Sources" at www.census.gov/hhes/www/income/method/guidance/index.html.

⁵⁸ The Census Bureau recommends data estimates from the three-year ACS instead of the one-year ACS when precision of the estimates are of primary importance. See http://www.census.gov/acs/www/guidance_for_data_users/estimates/.

⁵⁹ The 2008 HHS Poverty Guidelines and the State Median Income Estimates for FY 2009 were in effect on the first day of the Federal Fiscal Year, October 1, 2008.

⁶⁰ The State median income estimates for FY 2009 were published in *Federal Register* on March 5, 2008 (Volume 73, Number44)]. The HHS Poverty Income Guidelines were published in the *Federal Register* on January 23, 2008 (73 FR 3971-3972).

⁶¹ The Census Bureau changed the questions on disability in ACS in 2008. Since the new questions were not comparable to those in previous years, all disability questions were removed from the 2007-2009 ACS PUMS data file. The disability definition shown in the tables only 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. The reader should exercise caution in comparing the estimates of households with disabled individuals with those in previous *Notebooks*.

LIHEAP Home Energy Notebook for FY 2009: Appendix B: Income Eligible Household Estimates

Table B-1. State-level estimates of the number of LIHEAP income eligible households using the Federal maximum LIHEAP income standard of 75 percent of SMI by vulnerability category^{1/2/}

(Three-Year ACS 2007-2009)

State	Total number of LIHEAP eligible households ^{3/}	LIHEAP eligible households by vulnerability category ^{4/}			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 ^{5/}	
Alabama	730,898	270,669	126,992	107,911	270,852
Alaska	63,180	15,597	17,497	5,903	27,269
Arizona	793,384	279,428	177,413	67,591	304,198
Arkansas	409,926	152,575	80,822	59,225	141,515
California	4,443,710	1,519,986	1,007,507	381,618	1,762,930
Colorado	666,514	204,614	133,959	47,064	302,710
Connecticut	499,453	206,700	81,495	46,527	184,758
Delaware	120,313	48,204	23,493	10,057	44,179
District of Columbia	81,334	27,576	11,339	9,626	37,151
Florida	2,562,971	1,099,474	415,284	209,177	951,745
Georgia	1,308,090	422,644	277,853	132,709	542,440
Hawaii	158,643	59,961	30,457	12,590	63,950
Idaho	188,814	60,082	48,485	16,846	69,841
Illinois	1,795,788	657,670	343,397	150,446	717,069
Indiana	943,450	333,042	185,847	96,888	367,503
Iowa	439,735	170,351	76,864	35,750	171,477
Kansas	404,402	135,038	78,833	35,694	168,183
Kentucky	675,932	248,033	125,256	121,642	227,068
Louisiana	649,385	234,254	122,056	84,046	247,838
Maine	198,319	82,700	29,460	29,303	67,587
Maryland	754,557	285,091	139,183	59,749	303,859
Massachusetts	926,144	392,225	134,569	110,206	331,451
Michigan	1,575,674	572,318	274,650	174,510	626,547
Minnesota	786,331	287,636	139,516	62,734	321,224
Mississippi	437,229	160,342	85,644	69,730	153,240
Missouri	839,453	310,617	152,937	100,394	313,575
Montana	132,478	48,853	21,813	12,787	54,692
Nebraska	263,632	92,655	50,964	20,448	107,241
Nevada	295,244	100,995	65,275	21,752	118,169
New Hampshire	187,665	74,813	27,862	19,532	73,188
New Jersey	1,199,018	500,688	206,105	91,800	449,511
New Mexico	244,442	84,432	52,398	26,110	93,741
New York	2,705,957	1,085,173	454,846	272,208	1,023,763
North Carolina	1,304,413	461,248	253,120	136,434	513,727
North Dakota	103,131	37,659	16,568	6,587	44,717
Ohio	1,750,667	653,598	305,245	195,065	673,384
Oklahoma	489,339	167,809	103,898	60,165	184,054
Oregon	517,224	183,615	91,067	43,530	217,082
Pennsylvania	1,936,420	842,536	289,701	216,425	678,689
Rhode Island	154,672	63,765	23,970	20,288	53,788
South Carolina	629,722	234,882	116,713	70,706	240,890
South Dakota	116,198	43,127	21,713	8,995	46,221
Tennessee	914,211	339,673	168,986	117,288	341,212
Texas	2,940,363	897,675	755,844	263,466	1,172,885
Utah	257,424	71,305	78,214	16,923	99,123
Vermont	83,675	32,243	11,993	10,399	32,485
Virginia	1,025,078	378,297	186,910	98,574	406,974
Washington	866,394	294,664	167,000	85,587	353,359
West Virginia	297,586	119,794	44,368	56,734	97,541
Wisconsin	826,801	307,662	141,361	71,106	330,569
Wyoming	71,987	25,534	14,163	6,571	28,341
All States	41,767,370	15,379,522	7,990,905	4,187,416	16,155,505

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

^{2/}The greater of 75 percent of State median income estimates or 150 percent of the HHS Poverty Guidelines. For all States, 75 percent of State median income is greater than 150 percent of the HHS Poverty Guidelines.

^{3/}The three-year ACS estimate of the total number of all U.S. households is 113,104,074.

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

^{5/}The Census Bureau changed the questions on disability in ACS in 2008. Since the new questions were not comparable to those in previous years, all disability questions were removed from the 2007-2009 ACS data file. The definition above only 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. The reader should exercise caution in comparing these estimates with those in previous *Notebooks*.

LIHEAP Home Energy Notebook for FY 2009: Appendix B: Income Eligible Household Estimates

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

(Three-Year ACS 2007-2009)

State	Total number of LIHEAP eligible households ^{3/}	LIHEAP eligible households by vulnerability category ^{4/}			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 ^{5/}	
Alabama	575,474	211,675	103,474	91,616	205,602
Alaska	46,322	11,882	12,852	4,930	18,971
Arizona	604,487	210,048	140,833	56,016	224,995
Arkansas	327,423	119,062	69,384	50,333	109,082
California	3,504,925	1,202,159	811,422	327,402	1,346,921
Colorado	511,744	158,091	106,549	40,071	223,925
Connecticut	387,027	163,103	64,249	40,499	135,286
Delaware	91,924	37,988	18,810	8,190	31,373
District of Columbia	66,297	22,701	9,770	8,959	28,732
Florida	1,946,100	838,962	325,724	173,258	696,978
Georgia	1,017,950	334,279	221,980	112,567	403,566
Hawaii	120,192	46,114	22,371	11,037	47,353
Idaho	141,209	44,318	37,621	14,063	50,236
Illinois	1,398,681	511,820	275,500	130,295	540,572
Indiana	716,231	249,538	146,447	82,783	269,151
Iowa	328,668	128,775	58,332	29,969	123,310
Kansas	305,643	101,855	60,145	29,806	124,492
Kentucky	535,079	195,271	101,786	106,083	170,743
Louisiana	512,800	184,234	100,779	72,255	188,004
Maine	149,241	62,635	22,512	24,983	47,581
Maryland	571,665	223,338	108,272	52,266	214,861
Massachusetts	728,137	317,434	105,762	98,269	242,421
Michigan	1,219,874	429,812	222,860	151,160	474,085
Minnesota	595,269	226,162	105,877	54,648	228,758
Mississippi	356,209	129,890	72,879	60,047	119,847
Missouri	644,551	236,936	121,445	86,582	230,542
Montana	99,644	35,594	17,132	10,600	40,843
Nebraska	199,463	71,509	39,628	17,796	76,525
Nevada	217,160	74,887	49,515	17,058	83,401
New Hampshire	138,802	57,484	19,401	17,148	51,028
New Jersey	924,131	398,200	162,274	78,745	323,922
New Mexico	198,562	66,454	45,547	22,187	74,247
New York	2,146,979	865,542	366,411	237,686	784,524
North Carolina	1,015,906	359,496	205,574	116,091	383,135
North Dakota	78,068	29,387	12,698	5,397	32,473
Ohio	1,347,188	492,059	242,914	168,699	505,400
Oklahoma	377,165	125,958	82,628	50,516	139,156
Oregon	393,668	137,781	71,905	36,339	160,918
Pennsylvania	1,486,751	650,364	226,371	186,016	495,888
Rhode Island	124,182	52,032	19,370	18,368	40,296
South Carolina	491,923	185,186	93,440	59,783	180,477
South Dakota	86,121	33,176	17,283	7,552	31,194
Tennessee	711,662	263,331	135,287	98,707	256,044
Texas	2,307,914	705,935	618,305	224,116	882,444
Utah	186,312	50,977	55,719	13,592	71,587
Vermont	61,990	24,211	8,047	8,735	23,702
Virginia	781,932	298,026	144,847	83,418	292,348
Washington	655,866	221,453	128,633	74,096	259,257
West Virginia	232,289	89,664	36,868	48,672	73,877
Wisconsin	624,908	231,849	109,721	61,036	241,430
Wyoming	53,504	19,594	9,784	5,788	20,684
All States	32,345,212	11,938,231	6,366,937	3,586,228	12,022,187

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

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

^{3/}The three-year ACS estimate of the total number of all U.S. households is 113,104,074.

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

^{5/}The Census Bureau changed the questions on disability in ACS in 2008. Since the new questions were not comparable to those in previous years, all disability questions were removed from the 2007-2009 ACS data file. The definition above only 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. The reader should exercise caution in comparing these estimates with those in previous *Notebooks*.

LIHEAP Home Energy Notebook for FY 2009: Appendix B: Income Eligible Household Estimates

Table B-3. State-level estimates of the number of LIHEAP income eligible households using State LIHEAP income standards by vulnerability category^{1/ 2/}

(Three-Year ACS 2007-2009)

State	State Income Guidelines for 4-Person Household as percent of HHS Poverty Guidelines	Total number of LIHEAP eligible households ^{3/}	LIHEAP eligible households by vulnerability category ^{4/}			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 ^{2/}	
Alabama	175%	603,376	219,453	111,502	94,489	217,127
Alaska	150%	42,071	10,716	11,675	4,774	17,113
Arizona	225%	775,451	272,019	177,413	67,024	294,058
Arkansas	156%	342,738	125,089	71,923	52,698	114,315
California	265%	4,443,710	1,519,986	1,007,507	381,618	1,762,930
Colorado	185%	440,217	133,777	96,742	36,603	188,530
Connecticut	266%	387,027	163,103	64,249	40,499	135,286
Delaware	200%	82,099	33,359	17,470	7,658	27,836
District of Columbia	202%	66,297	22,701	9,770	8,959	28,732
Florida	156%	1,598,878	672,503	282,904	151,941	566,519
Georgia	150%	798,037	256,405	183,033	95,661	307,688
Hawaii	150%	79,874	29,956	15,973	8,962	30,113
Idaho	166%	147,163	45,678	39,681	14,384	52,628
Illinois	150%	924,152	312,608	197,594	99,115	356,691
Indiana	150%	527,090	170,345	116,848	67,947	196,819
Iowa	150%	239,135	88,338	45,834	24,052	89,696
Kansas	130%	179,226	53,978	39,000	21,271	71,942
Kentucky	130%	405,347	138,139	81,957	87,635	127,641
Louisiana	170%	512,800	184,234	100,779	72,255	188,004
Maine	225%	198,319	82,700	29,460	29,303	67,587
Maryland	175%	335,439	132,811	64,547	37,653	117,428
Massachusetts	253%	728,137	317,434	105,762	98,269	242,421
Michigan	114%	602,149	166,079	127,801	94,923	243,917
Minnesota	192%	476,262	179,367	88,132	48,392	177,048
Mississippi	125%	290,784	101,401	62,609	51,095	97,105
Missouri	135%	453,681	154,421	90,682	68,310	162,715
Montana	214%	131,872	48,470	21,813	12,787	54,469
Nebraska	125%	108,361	35,715	23,339	11,720	41,507
Nevada	150%	164,352	52,962	40,489	13,799	62,468
New Hampshire	247%	138,802	57,484	19,401	17,148	51,028
New Jersey	225%	774,626	333,211	142,713	71,099	262,418
New Mexico	149%	196,653	65,819	45,043	21,917	73,501
New York	214%	2,146,979	865,542	366,411	237,686	784,524
North Carolina	110%	571,790	180,028	126,245	72,967	220,349
North Dakota	191%	78,068	29,387	12,698	5,397	32,473
Ohio	175%	1,204,524	424,094	230,594	160,618	447,095
Oklahoma	130%	303,136	97,209	68,050	42,386	112,646
Oregon	183%	393,668	137,781	71,905	36,339	160,918
Pennsylvania	210%	1,486,751	650,364	226,371	186,016	495,888
Rhode Island	221%	124,182	52,032	19,370	18,368	40,296
South Carolina	150%	435,736	160,691	86,025	54,034	159,081
South Dakota	160%	74,831	28,843	15,719	7,094	25,999
Tennessee	125%	496,935	171,170	101,770	74,806	178,127
Texas	125%	1,638,821	474,248	468,500	169,608	615,148
Utah	150%	146,377	38,579	42,801	11,009	58,060
Vermont	125%	33,227	11,330	4,630	6,118	12,734
Virginia	130%	400,265	147,749	79,088	50,625	141,658
Washington	125%	334,111	96,968	68,773	50,032	134,589
West Virginia	135%	192,665	69,629	33,081	42,976	61,539
Wisconsin	150%	415,936	143,422	79,030	49,052	158,594
Wyoming	253%	71,987	25,534	14,163	6,571	28,341
All States	Not applicable	27,744,114	9,984,861	5,648,869	3,195,662	10,295,339

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

^{2/}State income guidelines can vary from 110 percent of the HHS Poverty Guidelines up to the Federal maximum LIHEAP income standard. The State maximum LIHEAP income standards for a household of four were obtained from ACF's LIHEAP Grantee Survey for FY 2009.

^{3/}The three-year ACS estimate of the total number of all U.S. households is 113,104,074.

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

^{5/}The Census Bureau changed the questions on disability in ACS in 2008. Since the new questions were not comparable to those in previous years, all disability questions were removed from the 2007-2009 ACS data file. The definition above only 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. The reader should exercise caution in comparing these estimates with those in previous *Notebooks*.

LIHEAP Home Energy Notebook for FY 2009: Appendix B: Income Eligible Household Estimates

Table B-4. State-level estimates of the number of LIHEAP income eligible households using the new (75 percent of SMI) Federal maximum LIHEAP income standard categorized by income as a percentage of HHS poverty guidelines^{1/2/}

(Three-Year ACS 2007-2009)

State	Total number of LIHEAP eligible households ^{3/}	Number of LIHEAP eligible households by intervals of HHS Poverty Guidelines			
		At or below poverty guidelines	>100 percent - 125 percent poverty guidelines	>125 percent - 150 percent poverty guidelines	Over 150 percent poverty guidelines
Alabama	730,898	294,839	108,522	104,447	223,090
Alaska	63,180	22,084	10,551	9,436	21,109
Arizona	793,384	269,895	101,293	106,566	315,630
Arkansas	409,926	189,239	72,129	66,018	82,540
California	4,443,710	1,315,798	549,336	531,884	2,046,692
Colorado	666,514	196,667	71,867	72,372	325,608
Connecticut	499,453	112,137	39,610	41,067	306,639
Delaware	120,313	30,032	13,292	12,698	64,291
District of Columbia	81,334	35,510	8,268	7,862	29,694
Florida	2,562,971	832,472	340,899	350,353	1,039,247
Georgia	1,308,090	467,315	167,413	163,309	510,053
Hawaii	158,643	47,736	15,962	16,176	78,769
Idaho	188,814	65,816	29,920	33,084	59,994
Illinois	1,795,788	531,774	190,911	201,467	871,636
Indiana	943,450	296,269	110,282	120,539	416,360
Iowa	439,735	125,548	55,731	57,856	200,600
Kansas	404,402	118,544	51,447	50,735	183,676
Kentucky	675,932	292,758	94,361	90,098	198,715
Louisiana	649,385	272,881	95,117	88,621	192,766
Maine	198,319	61,530	29,333	30,669	76,787
Maryland	754,557	158,488	56,051	58,663	481,355
Massachusetts	926,144	240,996	85,427	84,242	515,479
Michigan	1,575,674	507,008	169,274	174,584	724,808
Minnesota	786,331	190,395	74,614	78,503	442,819
Mississippi	437,229	216,409	74,375	64,214	82,231
Missouri	839,453	296,702	112,867	115,011	314,873
Montana	132,478	46,842	18,863	19,544	47,229
Nebraska	263,632	75,730	32,631	33,096	122,175
Nevada	295,244	87,890	36,676	39,786	130,892
New Hampshire	187,665	36,087	15,568	16,114	119,896
New Jersey	1,199,018	258,888	99,425	106,501	734,204
New Mexico	244,442	114,414	42,328	41,820	45,880
New York	2,705,957	895,056	291,610	298,311	1,220,980
North Carolina	1,304,413	501,976	189,584	179,968	432,885
North Dakota	103,131	31,870	12,167	12,091	47,003
Ohio	1,750,667	580,982	203,224	209,280	757,181
Oklahoma	489,339	206,456	80,904	78,461	123,518
Oregon	517,224	173,131	66,114	72,496	205,483
Pennsylvania	1,936,420	543,286	216,888	224,710	951,536
Rhode Island	154,672	45,778	17,281	17,734	73,879
South Carolina	629,722	255,998	93,489	86,249	193,986
South Dakota	116,198	37,064	17,186	15,120	46,828
Tennessee	914,211	365,944	130,991	130,294	286,982
Texas	2,940,363	1,204,104	434,717	420,170	881,372
Utah	257,424	75,045	34,877	36,455	111,047
Vermont	83,675	22,538	10,689	11,473	38,975
Virginia	1,025,078	276,964	104,204	101,132	542,778
Washington	866,394	246,765	87,346	94,673	437,610
West Virginia	297,586	124,692	49,399	46,795	76,700
Wisconsin	826,801	220,888	96,209	98,839	410,865
Wyoming	71,987	18,094	7,782	8,983	37,128
All States	41,767,370	13,635,324	5,119,004	5,130,569	17,882,473

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

^{2/}The greater of 75 percent of State median income estimates or 150 percent of the HHS Poverty Guidelines.

^{3/}The three-year ACS estimate of the total number of all U.S. households is 113,104,074.

LIHEAP Home Energy Notebook for FY 2009: Appendix B: Income Eligible Household Estimates

Table B-5. State-level estimates of the number of LIHEAP income eligible households using the previous Federal maximum LIHEAP income standard categorized by income as a percentage of HHS poverty guidelines^{1/2/}

(Three-Year ACS 2007-2009)

State	Total number of LIHEAP eligible households ^{3/}	Number of LIHEAP eligible households by intervals of HHS Poverty Guidelines			
		At or below poverty guidelines	>100 percent - 125 percent poverty guidelines	>125 percent - 150 percent poverty guidelines	Over 150 percent poverty guidelines
Alabama	575,474	294,839	108,522	104,447	67,666
Alaska	46,322	22,084	10,551	9,436	4,251
Arizona	604,487	269,895	101,293	106,566	126,733
Arkansas	327,423	189,239	72,129	66,018	37
California	3,504,925	1,315,798	549,336	531,884	1,107,907
Colorado	511,744	196,667	71,867	72,372	170,838
Connecticut	387,027	112,137	39,610	41,067	194,213
Delaware	91,924	30,032	13,292	12,698	35,902
District of Columbia	66,297	35,510	8,268	7,862	14,657
Florida	1,946,100	832,472	340,899	350,353	422,376
Georgia	1,017,950	467,315	167,413	163,309	219,913
Hawaii	120,192	47,736	15,962	16,176	40,318
Idaho	141,209	65,816	29,920	33,084	12,389
Illinois	1,398,681	531,774	190,911	201,467	474,529
Indiana	716,231	296,269	110,282	120,539	189,141
Iowa	328,668	125,548	55,731	57,856	89,533
Kansas	305,643	118,544	51,447	50,735	84,917
Kentucky	535,079	292,758	94,361	90,098	57,862
Louisiana	512,800	272,881	95,117	88,621	56,181
Maine	149,241	61,530	29,333	30,669	27,709
Maryland	571,665	158,488	56,051	58,663	298,463
Massachusetts	728,137	240,996	85,427	84,242	317,472
Michigan	1,219,874	507,008	169,274	174,584	369,008
Minnesota	595,269	190,395	74,614	78,503	251,757
Mississippi	356,209	216,409	74,375	64,214	1,211
Missouri	644,551	296,702	112,867	115,011	119,971
Montana	99,644	46,842	18,863	19,544	14,395
Nebraska	199,463	75,730	32,631	33,096	58,006
Nevada	217,160	87,890	36,676	39,786	52,808
New Hampshire	138,802	36,087	15,568	16,114	71,033
New Jersey	924,131	258,888	99,425	106,501	459,317
New Mexico	198,562	114,414	42,328	41,820	-
New York	2,146,979	895,056	291,610	298,311	662,002
North Carolina	1,015,906	501,976	189,584	179,968	144,378
North Dakota	78,068	31,870	12,167	12,091	21,940
Ohio	1,347,188	580,982	203,224	209,280	353,702
Oklahoma	377,165	206,456	80,904	78,461	11,344
Oregon	393,668	173,131	66,114	72,496	81,927
Pennsylvania	1,486,751	543,286	216,888	224,710	501,867
Rhode Island	124,182	45,778	17,281	17,734	43,389
South Carolina	491,923	255,998	93,489	86,249	56,187
South Dakota	86,121	37,064	17,186	15,120	16,751
Tennessee	711,662	365,944	130,991	130,294	84,433
Texas	2,307,914	1,204,104	434,717	420,170	248,923
Utah	186,312	75,045	34,877	36,455	39,935
Vermont	61,990	22,538	10,689	11,473	17,290
Virginia	781,932	276,964	104,204	101,132	299,632
Washington	655,866	246,765	87,346	94,673	227,082
West Virginia	232,289	124,692	49,399	46,795	11,403
Wisconsin	624,908	220,888	96,209	98,839	208,972
Wyoming	53,504	18,094	7,782	8,983	18,645
All States	32,345,212	13,635,324	5,119,004	5,130,569	8,460,315

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

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

^{3/} The three-year ACS estimate of the total number of all U.S. households is 113,104,074.

LIHEAP Home Energy Notebook for FY 2009: Appendix B: Income Eligible Household Estimates

Table B-6. State-level estimates of the number of LIHEAP income eligible households using the State maximum LIHEAP income standards categorized by income as a percentage of HHS poverty guidelines^{1/ 2/}

(Three-Year ACS 2007-2009)

State	State Income Guidelines for 4-Person Household as % of HHS Poverty Guidelines	Total number of LIHEAP eligible Households ^{2/}	Number of LIHEAP eligible households by HHS poverty intervals			
			At or below poverty guidelines	>100 percent-125 percent poverty guidelines	>125 percent-150 percent poverty guidelines	Over 150 percent poverty guidelines
Alabama	175%	603,376	294,839	108,522	104,447	95,568
Alaska	150%	42,071	22,084	10,551	9,436	-
Arizona	225%	775,451	269,895	101,293	106,566	297,697
Arkansas	156%	342,738	189,239	72,129	66,018	15,352
California	265%	4,443,710	1,315,798	549,336	531,884	2,046,692
Colorado	185%	440,217	196,667	71,867	72,372	99,311
Connecticut	266%	387,027	112,137	39,610	41,067	194,213
Delaware	200%	82,099	30,032	13,292	12,698	26,077
District of Columbia	202%	66,297	35,510	8,268	7,862	14,657
Florida	156%	1,598,878	832,472	340,899	350,353	75,154
Georgia	150%	798,037	467,315	167,413	163,309	-
Hawaii	150%	79,874	47,736	15,962	16,176	-
Idaho	166%	147,163	65,816	29,920	33,084	18,343
Illinois	150%	924,152	531,774	190,911	201,467	-
Indiana	150%	527,090	296,269	110,282	120,539	-
Iowa	150%	239,135	125,548	55,731	57,856	-
Kansas	130%	179,226	118,544	51,447	9,235	-
Kentucky	130%	405,347	292,758	94,361	18,228	-
Louisiana	170%	512,800	272,881	95,117	88,621	56,181
Maine	225%	198,319	61,530	29,333	30,669	76,787
Maryland	175%	335,439	158,488	56,051	58,663	62,237
Massachusetts	253%	728,137	240,996	85,427	84,242	317,472
Michigan	114%	602,149	507,008	95,141	-	-
Minnesota	192%	476,262	190,395	74,614	78,503	132,750
Mississippi	125%	290,784	216,409	74,375	-	-
Missouri	135%	453,681	296,702	112,867	44,112	-
Montana	214%	131,872	46,842	18,863	19,544	46,623
Nebraska	125%	108,361	75,730	32,631	-	-
Nevada	150%	164,352	87,890	36,676	39,786	-
New Hampshire	247%	138,802	36,087	15,568	16,114	71,033
New Jersey	225%	774,626	258,888	99,425	106,501	309,812
New Mexico	149%	196,653	114,414	42,328	39,911	-
New York	214%	2,146,979	895,056	291,610	298,311	662,002
North Carolina	110%	571,790	501,976	69,814	-	-
North Dakota	191%	78,068	31,870	12,167	12,091	21,940
Ohio	175%	1,204,524	580,982	203,224	209,280	211,038
Oklahoma	130%	303,136	206,456	80,904	15,776	-
Oregon	183%	393,668	173,131	66,114	72,496	81,927
Pennsylvania	210%	1,486,751	543,286	216,888	224,710	501,867
Rhode Island	221%	124,182	45,778	17,281	17,734	43,389
South Carolina	150%	435,736	255,998	93,489	86,249	-
South Dakota	160%	74,831	37,064	17,186	15,120	5,461
Tennessee	125%	496,935	365,944	130,991	-	-
Texas	125%	1,638,821	1,204,104	434,717	-	-
Utah	150%	146,377	75,045	34,877	36,455	-
Vermont	125%	33,227	22,538	10,689	-	-
Virginia	130%	400,265	276,964	104,204	19,097	-
Washington	125%	334,111	246,765	87,346	-	-
West Virginia	135%	192,665	124,692	49,399	18,574	-
Wisconsin	150%	415,936	220,888	96,209	98,839	-
Wyoming	253%	71,987	18,094	7,782	8,983	37,128
All States	Not applicable	27,744,114	13,635,324	4,925,101	3,662,978	5,520,711

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

^{2/}State income guidelines can vary from 110 percent of the HHS Poverty Guidelines up to the Federal maximum LIHEAP income standard. The State maximum LIHEAP income standards for a family of four were obtained from ACF's LIHEAP Grantee Survey for FY 2009.

^{3/}The three-year ACS estimate of the total number of all U.S. households is 113,104,074.