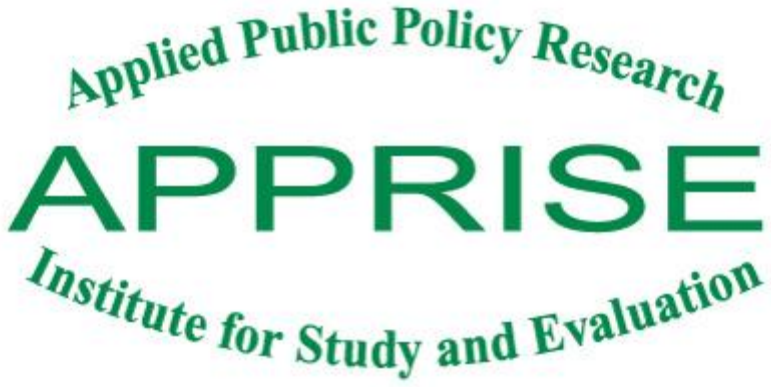

LIHEAP SPECIAL STUDY OF THE 2005 RESIDENTIAL ENERGY CONSUMPTION SURVEY

DIMENSIONS OF ENERGY INSECURITY FOR LOW INCOME HOUSEHOLDS

Final Report

This document has been prepared for the Office of Community Services' Division of Energy Assistance by APPRISE Incorporated under contract #DE-AM01-04EI41006. The statements, findings, conclusions, and recommendations are solely those of analysts from APPRISE and do not necessarily reflect the views of HHS.

Prepared for the U.S. Department of Health and Human Services, Administration for Children and Families, Office of Community Services, Division of Energy Assistance

February 2010

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Executive Summary

The 2005 Residential Energy Consumption Survey (RECS) is a national survey that collected energy-related data for occupied housing units and households. The Office of Community Services (OCS) in the Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services (HHS) funded a special set of questions for low income households responding to the 2005 RECS. Those questions collected information on residential and home energy-related problems faced by low income households and measured the extent to which participation in LIHEAP helped to ameliorate those problems.[1] The purpose of this report is to present the findings from analyses of those questions.

Study Goals

In RECS surveys prior to 2005, survey questions on energy affordability issues were limited to heating service disconnections and other electric service disconnections. However, low income households can experience other problems as result of having high energy bills. For example, in order to make their home energy bill affordable, a household might have to keep the home at a temperature that is unhealthy, particularly for young children, disabled, or elderly individuals. The 2005 RECS included a set of questions that documented the different types of energy affordability problems that low income households face. The purpose of this study is use the 2005 RECS data to develop information on the Energy Insecurity[2] of low income households, including:

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

- Factors Related to Energy Insecurity – An analysis of the factors associated with energy problems including income, energy burden, geographic region and other demographic and housing factors.

[1] 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 or 60 percent of State median income).

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

- Performance of the Home Energy Insecurity Scale – An assessment of the performance of the Home Energy Insecurity Scale[3] in measuring the impacts of energy costs on low income households compared to other Energy Insecurity measures used in the past.

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

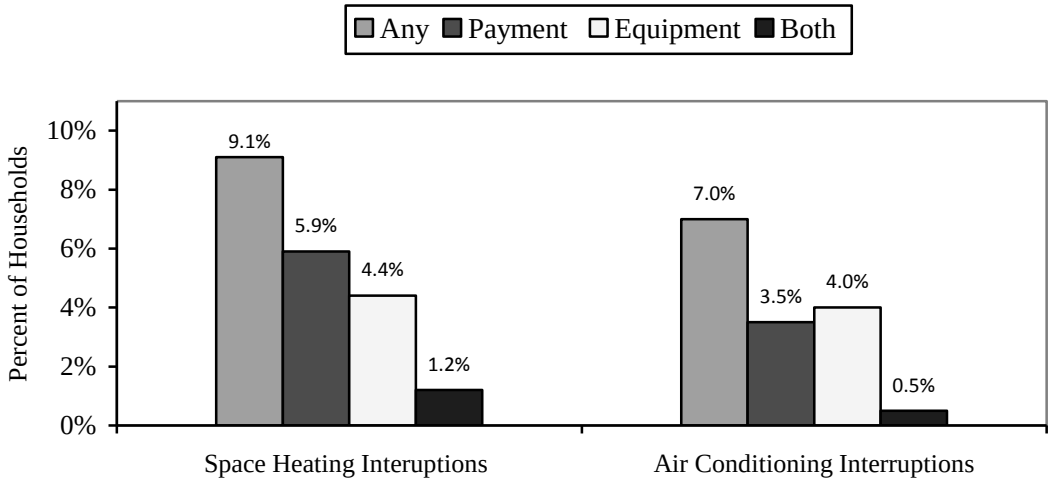
Levels and Types of Energy Insecurity

The most observable types of Energy Insecurity are the interruption of space heating services during the heating season and the interruption of air conditioning services during the cooling season. The 2005 RECS furnishes information on the estimated number of low income households that reported heating or air conditioning interruptions in the twelve months prior to the survey.

Figure 1 presents statistics on heating and air conditioning interruptions. Payment interruptions refer to those caused by loss of service due to energy bill payment problems. Equipment interruptions refer to those that occurred when heating or cooling equipment malfunctioned and the household could not afford to pay for its repair or replacement. The figure shows that 9.1 percent of low income households had some type of space heating interruptions due to any reasons; 5.9 percent had interruptions due to bill payment problems, 4.4 percent had interruptions due to equipment problems, and 1.2 percent experienced both types of problems. The figure also shows that 7.0 percent of low income households that cooled had some type of air conditioning interruptions due to any reasons; 3.5 percent had interruptions due to bill payment problems, 4.0 percent had interruptions due to equipment problems, and 0.5 percent had both types of interruptions. Overall, 11.6 percent of low income households experienced a space heating interruption, an air conditioning interruption, or both types of problems.

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

Figure 1
Space Heating and Air Conditioning Service Interruptions in the Past 12 Months
By Reason for Interruption
Low Income Households, 2005



Source: 2005 RECS

About 5.9 percent of low income households had space heating interruptions during the heating season due to bill payment problems in 2005. A review of statistics from previous RECS surveys finds that the 2005 incidence of space heating interruptions is the highest ever measured, and is more than twice the incidence observed in the 2001 RECS survey (2.7 percent).

The households, which reported experiencing heating or cooling interruptions in the past year and also self-reported that they received energy assistance in the 2005 RECS survey, were asked a series of questions to assess the role of energy assistance in restoring the service for these households. The 2005 RECS showed that energy assistance plays an important role in restoring space heating and air conditioning service. Of the estimated 1.2 million energy assistance recipient households that reported space heating interruptions, 59.0 percent indicated that energy assistance assisted them in restoring heating service, either by helping them to pay their heating bill or by helping to pay for repair or replacement of their space heating system. Similarly, of the estimated 0.5 million energy assistance recipient households that reported air conditioning interruptions, 40.3 percent indicated that energy assistance assisted them in restoring air conditioning service, either by helping to pay the electric bill or by helping to repair or replace their air conditioning equipment.

The 2005 RECS included survey questions to help measure the financial and health/safety dimensions of Energy Insecurity. These questions are presented in Table 1. For each dimension, respondents were asked to report whether they experienced that problem "almost every month, some months, only one or two months, or never."

In this part of the Executive Summary, low income households are identified as having financial Energy Insecurity if they answered at least one of the financial Energy Insecurity questions in Table 1 as almost every month, some months, or only one or two months. Similarly, low income

households are identified as having health and safety Energy Insecurity if they answered at least one of the health and safety questions in Table 1 as almost every month, some months, or only one or two months.

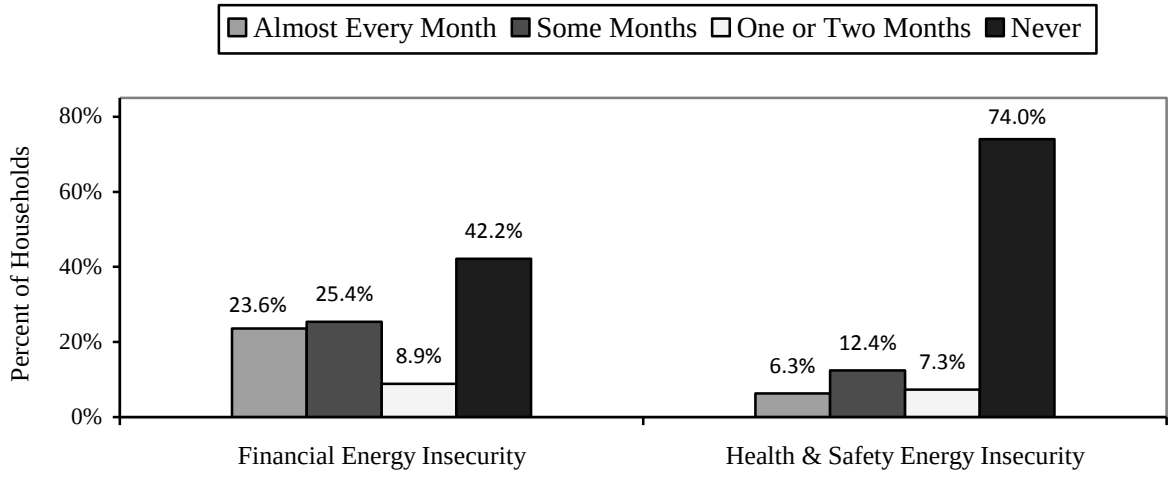
Table 1
Financial and Health/Safety Energy Insecurity Questions, 2005 RECS

Financial Energy Insecurity	Health and Safety Energy Insecurity
Did you worry that you would not be able to pay your home energy bill?	Did you close off part of your home because you couldn't afford to heat or cool it?
Did you reduce your expenses for what you consider to be basic household necessities?	Did you keep your home at a temperature that you felt was unsafe or unhealthy at any time of the year?
Did you borrow from a friend or relative to pay your home energy bill?	Did you leave your home for part of the day because it was too hot or too cold?
Did you skip paying your home energy bill or pay less than your whole home energy bill?	Did you use your kitchen stove or oven to provide heat?
Did you have a supplier of your electric or home heating service threaten to disconnect your electricity or home heating fuel service, or discontinue making fuel deliveries?	

Figure 2 presents statistics on respondent reports of the financial dimensions of Energy Insecurity and the health and safety dimensions of Energy Insecurity. The figure shows that 23.6 percent of low income households had one or more types of financial Energy Insecurity "almost every month," and that an additional 25.4 percent had one or more types of financial Energy Insecurity "some months." In total, 57.8 percent of low income households reported some type of financial Energy Insecurity in the previous twelve months.

By comparison, somewhat fewer households reported health and safety Energy Insecurity. About 6.3 percent reported having some type of health and safety Energy Insecurity "almost every month." In total, about 26.0 percent of households reported some type of health and safety Energy Insecurity in the past twelve months.

Figure 2
Financial and Health/Safety Energy Insecurity in the Past 12 Months
By Frequency of Energy Insecurity
Low Income Households, 2005



Source: 2005 RECS

The analysis also shows that there is a relationship between the incidence of financial Energy Insecurity and the other Energy Insecurity dimensions. Almost one-fourth of households that reported experiencing financial Energy Insecurity "almost every month" also reported a space heating interruption, while only 8 percent of those who reported financial Energy Insecurity in "one or two months" had a space heating interruption. About one-half of households that reported having financial Energy Insecurity "almost every month" also reported experiencing some type of health and safety Energy Insecurity.

The analysis of the 2005 RECS Energy Insecurity data finds that the series of questions help to better understand the energy affordability problems faced by low income households. The data on different types of energy insecurity (heating disruptions, air conditioning disruptions, financial energy insecurity, and health and safety energy insecurity) and the intensity measures of energy insecurity (almost every month, some months, one or two months, or never) serve to broaden the understanding of energy affordability problems. Key findings include:

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

- Overlap – Some households faced only one type of problem; but many others experienced multiple problems during the year.

- Intensity – The intensity of any dimension of energy insecurity was directly related to the number of types of energy insecurity faced by a low income household.

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

Factors Related to Energy Insecurity

The 2005 RECS facilitates the development of a better understanding of the geographic, demographic, and programmatic dimensions of Energy Insecurity for low income households. This study developed tabulations that show how Energy Insecurity varies by Census Region, by income and poverty group, by income source and vulnerability group, and by level of energy burden. The tabulations also illustrate how the experiences of LIHEAP recipient households compare to income eligible nonrecipient households.

Geography

The RECS data show that low income households in the South and West Census regions experienced higher rates of heating and air conditioning service interruptions than households in the Northeast and Midwest. Similar patterns are observed for other types of Energy Insecurity:

- Heating and Air Conditioning Interruptions – About 7.1 percent of low income households in the Northeast and 8.8 percent of those in the Midwest had heating and/or air conditioning interruptions during the past 12 months. In the South and West regions, more than 14.1 percent of low income households experienced heating and/or air conditioning interruptions.

- Financial Energy Insecurity – Low income households in the Northeast are less likely than those in other regions to report financial Energy Insecurity; about 39.0 percent of low income households in the Northeast reported having to reduce expenses for household necessities, compared to at least 49.5 percent in the other three regions.

- Health and Safety Insecurity – There are also some differences by region in health and safety measures. For example, about 5.7 percent of low income households in the Northeast reported keeping their home at a temperature that they felt was unsafe compared to 10.1 percent of low income households in the South. However, in general, low income households in the Northeast reported lower rates of health and safety Energy Insecurity than those in other regions.

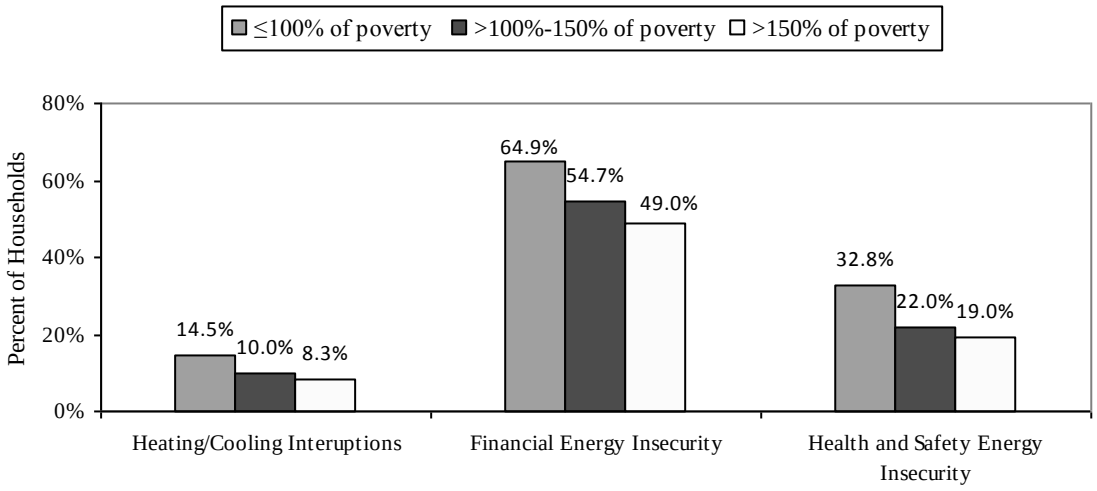
Previous research has shown that restrictions on cold weather service terminations in the Northeast and Midwest may be one important reason why low income households in those regions are less likely to experience heating service interruptions than low income households in the South and West. However, it is unclear why households in the Northeast region also have lower rates of health and safety Energy Insecurity than households in other regions. One possibility is that winter service termination restrictions allow clients to defer winter bills so that they do not need to make health and safety trade-offs when it is cold. Another possibility is that

non-LIHEAP fuel assistance programs may affect the differential rates of Energy Insecurity in different regions.

Poverty Level

Figure 3 shows the incidence of service interruptions, financial Energy Insecurity, and health and safety Energy Insecurity by poverty level. Households with income at or below the HHS Poverty Guidelines have higher rates for all types of Energy Insecurity than other types of low income households.

Figure 3
Service Interruptions, Financial Energy Insecurity, and Health and Safety Energy Insecurity in the Past 12 Months By Poverty Level Low Income Households, 2005



Source: 2005 RECS

These data show that poverty level is one important dimension of Energy Insecurity. However, they also show that some households with income at or below the HHS Poverty Guidelines do not experience Energy Insecurity while many households with higher income do experience Energy Insecurity. Since LIHEAP's funding level does not allow it to serve all low income households, it may be appropriate to target households that are experiencing higher levels of Energy Insecurity.

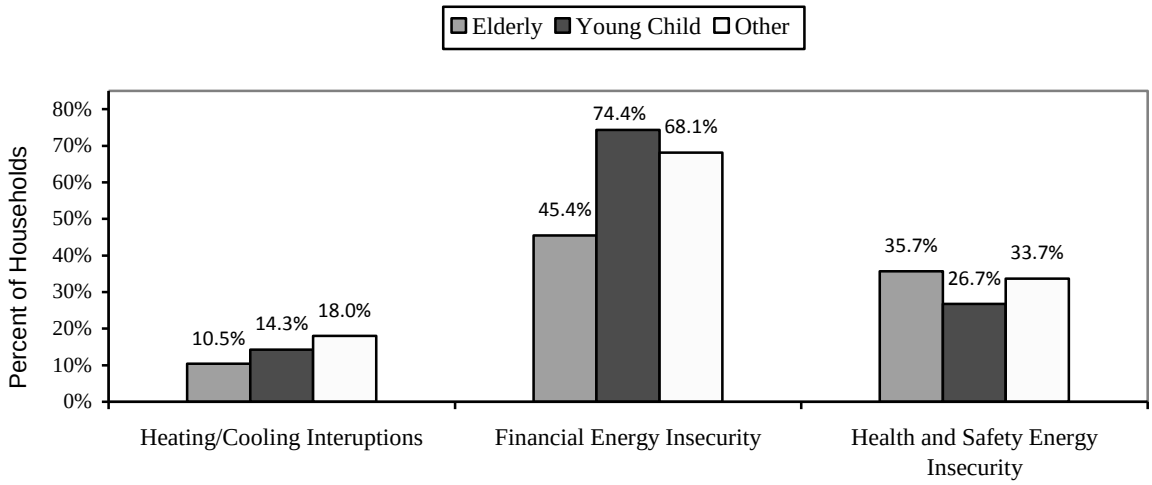
Vulnerability Group

Elderly individuals and young children are more vulnerable to the health implications from inadequate heating or cooling.[4] Figure 4 shows the incidence of service interruptions, financial Energy Insecurity, and health and safety Energy Insecurity by vulnerability group. It is restricted

[4] Note that the LIHEAP statute also considers disabled individuals to be vulnerable. However, the 2005 RECS did not collect information on disability.

to households with income at or below the HHS Poverty Guidelines to eliminate any income dimension from the analysis. The figure shows that elderly households are less likely to have service interruptions than young child households and other types of households, and are slightly less likely to have financial Energy Insecurity. However, elderly households have higher rates of health and safety Energy Insecurity than the other household groups.

Figure 4
Service Interruptions, Financial Energy Insecurity, and Health and Safety Energy Insecurity in the Past 12 Months By Vulnerability Group Households with Income at or below HHS Poverty Guidelines, 2005



Source: 2005 RECS

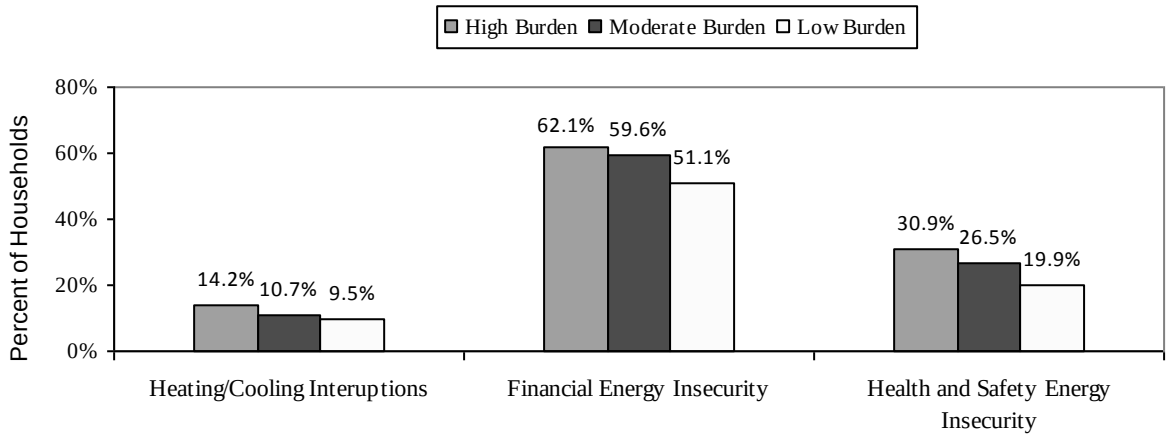
Previous research has shown that elderly households are more likely to pay their energy bills and are less likely to lose energy service than other types of households. This research confirms that finding. Moreover, this research further finds that low income elderly households are no more likely than other types of low income households to report that they have to reduce expenses for basic necessities to pay their energy bills. However, it does find that low income elderly households are more likely to keep their home at a temperature that they feel is unsafe because of the cost of energy. Further research on these findings might reveal whether these findings relate to differences in behavior, differences in financial resources, or differences in reporting by different groups of households.

Energy Burden

There are two types of energy burden examined in the study: residential energy burden, which is the percent of household income spent on all residential energy bills, and home energy burden, which is the percent of household income spent on space heating and cooling. Figure 5 shows the incidence of service interruptions, financial Energy Insecurity, and health and safety Energy Insecurity by residential energy burden level and Figure 6 shows those statistics by home energy

burden level.[5] Figure 5 shows that higher residential energy burden is associated with higher levels of all types of Energy Insecurity. However, Figure 6 shows that home energy burden is not associated with Energy Insecurity.

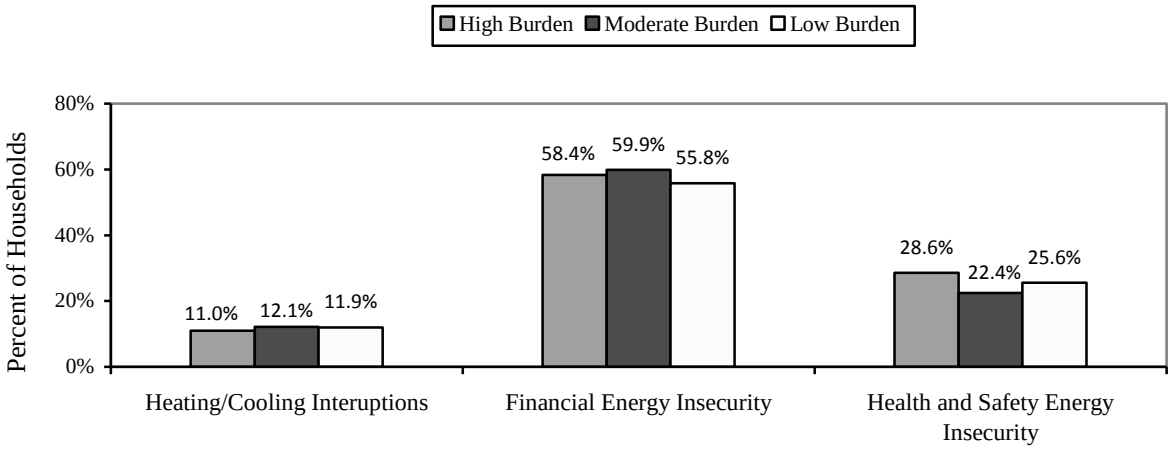
Figure 5
Service Interruptions, Financial Energy Insecurity, and Health and Safety Energy Insecurity in the Past 12 Months By Residential Energy Burden Level Low Income Households, 2005



Source: 2005 RECS

[5] This study defines high energy burden as the "energy share" of severe housing (shelter) burden. Severe housing burden is considered by some researchers to be 50% of income. (See Cushing N. Dolbeare. 2001. "Housing Affordability: Challenge and Context." Cityscape: A Journal of Policy Development and Research, (5)2:111-130. A Publication of the U.S. Department of Housing and Urban Development, Office of Policy Development and Research.) The median total residential energy costs for households at or below 150 percent of the HHS' Poverty Guidelines are 21.8 percent of housing costs. This study defines a residential energy burden of 10.9 percent of income as a high burden, moderate energy burden as costs at or above 6.5 percent of income but less than 10.9 percent of income, and low energy burden as costs less than 6.5 percent of income. Heating and cooling expenditures comprise 39.3 percent of total residential energy expenditures for all households. Therefore, high home energy burden is defined for purposes of this study as heating and cooling costs that exceed 4.3 percent of income. Moderate home energy burden is defined as heating and cooling costs above 2.6 percent of income but less than 4.3 percent of income.

Figure 6
Service Interruptions, Financial Energy Insecurity, and Health and Safety Energy Insecurity in the Past 12 Months By Home Energy Burden Level Low Income Households, 2005



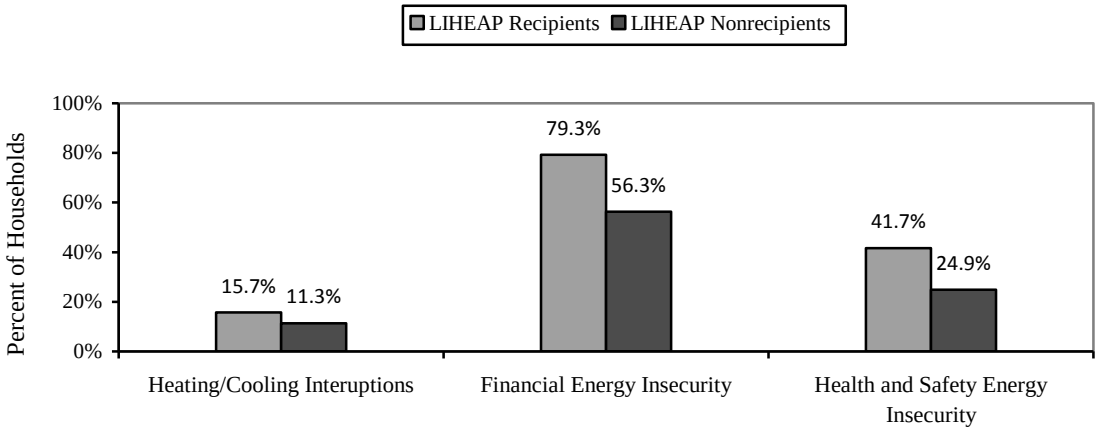
Source: 2005 RECS

By law, LIHEAP focuses, in part, on home energy burden in the distribution of LIHEAP benefits. However, the findings from this research suggest that residential energy burden is a more robust indicator of the potential for Energy Insecurity compared to home energy burden. It is important to note that the RECS uses regression analyses to provide estimates of the amounts of residential energy expenditures going to various end uses, including home heating and cooling. Actual heating and cooling expenditures may differ than those estimated by the RECS.

LIHEAP Recipiency

Figure 7 shows the incidence of service interruptions, financial Energy Insecurity, and health and safety Energy Insecurity for LIHEAP recipients and for income eligible nonrecipients. LIHEAP recipients have higher rates for all types of Energy Insecurity than income eligible nonrecipients. This suggests that LIHEAP is effectively targeting households with higher levels of Energy Insecurity.

Figure 7
Service Interruptions, Financial Energy Insecurity, and Health and Safety Energy Insecurity in the Past 12 Months By LIHEAP Recipient Group Low Income Households, 2005



Source: 2005 RECS

Figure 7 also shows that some LIHEAP recipients do not experience Energy Insecurity. One important research question that cannot be answered with the existing RECS survey data is whether recipient households do not experience Energy Insecurity *because* they received LIHEAP benefits or if they would not experience Energy Insecurity even if they did not receive LIHEAP.

Multivariate Analysis

Data tabulations from the 2005 RECS show the geographic, demographic, and programmatic dimensions of Energy Insecurity. However, a multivariate analysis of the data is needed to see how all these factors simultaneously affect the Energy Insecurity of low income households and to assess which are the most important factors associated with levels of Energy Insecurity. Some key findings from the multivariate analysis included:

- Census Region – The multivariate analysis confirmed that households in the South and West were more likely to have service interruptions than households in the other regions and households in the Northeast had the lowest rate of health and safety Energy Insecurity. However, the multivariate analysis found that lower rates of financial Energy Insecurity in the Northeast are related to other factors and that households in all regions experience financial Energy Insecurity at about the same level.

- Residential Energy Burden – The multivariate analysis confirmed the findings that both poverty level and residential energy burden are associated with all types of Energy Insecurity. Furthermore, the analysis also showed that residential energy burden has the strongest relationship with Energy Insecurity.

Most findings from the multivariate analyses were consistent with the findings from the tabular analyses of the data. Therefore, the reader can rely on the results from the tabular analyses. Multivariate analysis indicated that high residential energy burden is the strongest factor related to Energy Insecurity of low income households compared to other factors included in the analysis.

Performance of the Home Energy Insecurity Scale

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

- "A ***thriving*** household is one that has achieved generally accepted standards of well-being. A thriving household can engage in the full range of home energy uses of its choice without outside assistance and without financial strain.

- A ***capable*** household is secure, even though not having achieved the full range of generally accepted standards of well-being.

- A ***stable*** household does not face significant threats and is unlikely to be in immediate crisis. A stable household may on infrequent occasion need to engage in temporary or inappropriate actions because it lacks money to pay its home energy bills, but it does not do so regularly.

- A ***vulnerable*** household is one that is not in immediate danger, but that may avoid this danger only through temporary or inappropriate solutions. A vulnerable household may occasionally face energy choices that require it to compromise not merely on comfort and/or convenience, but on basic household energy needs such as heating and/or hot water.

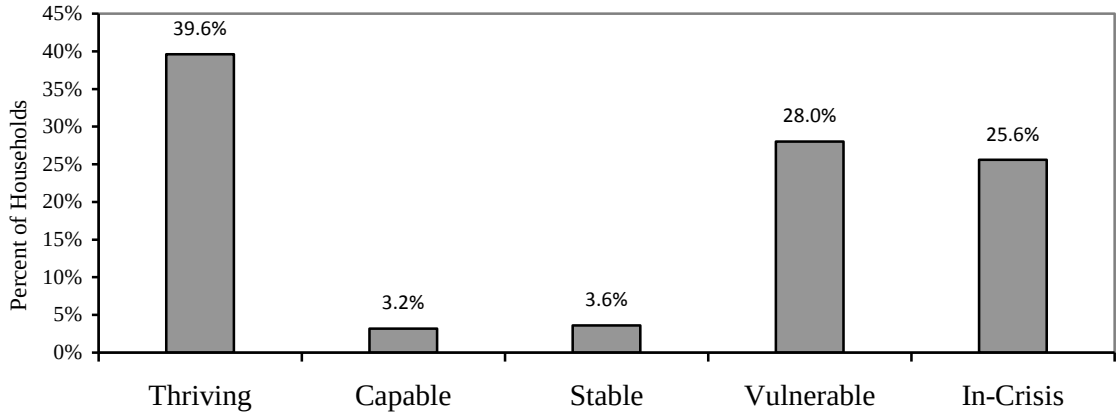
- An ***in-crisis*** household faces immediate needs that threaten the household's physical and/or emotional safety. Three alternative conditions exist of which anyone might place someone in the "in-crisis" threshold: (1) the household goes without energy; or (2) the household has energy, but has to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

The Home Energy Insecurity Scale was initially developed as a tool for caseworkers to measure the impact of energy assistance programs on the home Energy Insecurity of low income households. APPRISE subsequently collaborated with Colton and developed a modified set of questions. The modified instrument could be used by interviewers, and allows a systematic and automated assessment of Energy Insecurity based on survey responses.

Most of the previous research using the Home Energy Insecurity Scale was focused on LIHEAP recipients or was collected for a set of households in a particular geographic area. The 2005 RECS furnishes the first national data on Energy Insecurity for all low income households.

Figure 8 shows the level of Energy Insecurity using the initial categorization methodology. It can be seen that the original scale assigns almost all households to three categories – Thriving, Vulnerable, and In-Crisis. After reviewing the categorization methodology, an alternative assignment procedure was tested to assess whether minor revisions to the categorization procedures would change the distribution of households. In fact, the changes resulted in a significant redistribution. This suggests that more research needs to be done on assignment to the scale.

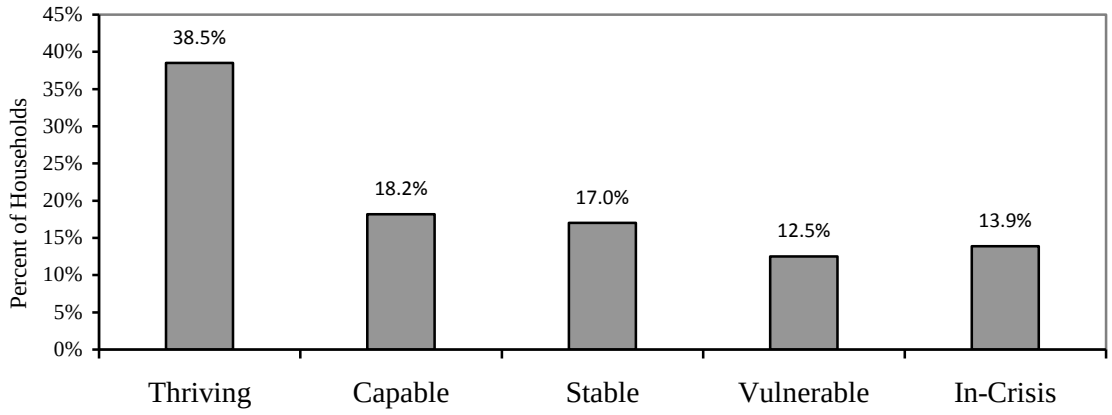
Figure 8
Home Energy Insecurity, Original Scale
Low Income Households, 2005



Source: 2005 RECS

Figure 9 presents Home Energy Insecurity on the revised scale. The modified scale shows that about 40 percent of low income households are thriving (i.e., report no Energy Insecurity problems), while about one-fourth are vulnerable or in-crisis, indicating that they needed immediate action during the year to resolve Energy Insecurity problems.

Figure 9
Home Energy Insecurity, Modified Scale
Low Income Households, 2005



Source: 2005 RECS

The modified Home Energy Insecurity Scale furnishes useful summary information about the factors related to Energy Insecurity.

- *Geographic Distribution* – While households in the South and West are most likely to be categorized as vulnerable or in-crisis, a substantial percentage of low income households in all regions are at risk.

- *Poverty Level* – About one-third of households with income below poverty are vulnerable or in-crisis, compared to about one-fifth of households with income above 150 percent of the poverty level.

- *Vulnerability Group* – About 40 percent of elderly households with incomes below poverty are categorized as thriving, compared to about one-fourth of households with young children and other households.

- *Residential Energy Burden* – About one-third of households with high residential energy burden are vulnerable or in-crisis, compared to one-fourth of moderate burden households, and one-fifth of low-burden households.

- *LIHEAP Recipients* – Almost one-half of LIHEAP recipients were vulnerable or in-crisis, compared to one-fourth of nonrecipients.

The modified Home Energy Insecurity Scale appears to be a useful way to assess the need for energy assistance for low income households. It shows that certain groups of households are more likely to be at greater risk for having energy problems, but it also shows that low income households of all types report Energy Insecurity. It may be appropriate to use the Home Energy Insecurity Scale as a performance measure to assess the rate at which LIHEAP is reaching those with the greatest need for energy assistance. Furthermore, when measuring Energy Insecurity

for LIHEAP recipient households, it is important to focus on whether Energy Insecurity is measured before or after receiving LIHEAP assistance so that the change in Energy Insecurity can be assessed.

Study Implications

The 2005 RECS included a set of questions that documented the different types of energy affordability problems that low income households face. The study finds that the Energy Insecurity questions administered in the 2005 RECS offer a much more comprehensive understanding of the energy problems faced by low income households than did the more limited set of questions included in prior RECS surveys. The analysis suggests that the questions added to the 2005 RECS represent an important contribution to document and understand the energy needs of low income households.

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

- *Poverty Level* – The analysis shows that poverty level, rather than income level, is associated with all types of Energy Insecurity.

- *Energy Burden* – Residential energy burden is associated with Energy Insecurity while home energy burden is very weakly associated; States might be able to increase the effectiveness of their LIHEAP programs by using actual residential energy bills to help set benefit levels.

- *Vulnerable Groups* – It is important for States to consider all types of Energy Insecurity in setting benefits. While low income elderly households have lower rates of service interruptions and financial Energy Insecurity, they report similar rates of health and safety Energy Insecurity as non-elderly low income households.

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

1. *LIHEAP Targeting* – The Home Energy Insecurity Scale makes it easier for LIHEAP program managers to see what groups of households are at greatest risk for problems resulting from energy affordability.

2. *Performance Measurement* – It is clear that some low income households have a higher level of Energy Insecurity than others. It may be appropriate to use the reduction in Energy Insecurity as a performance measure for LIHEAP.

3. *Study and Analysis* – It is important to measure how the different levels of Home Energy Insecurity relate to the long term health and well-being of low income

households. For that reason, it would be appropriate to continue to study the Home Energy Insecurity Scale and its policy implications.

I. Introduction

The 2005 Residential Energy Consumption Survey (RECS) is a national survey that collected energy-related data for occupied housing units and households. The Office of Community Services (OCS) in the Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services (HHS) funded a special set of questions for low income households responding to the 2005 RECS. Those questions collected information on residential and home energy-related problems faced by low income households and measured the extent to which participation in LIHEAP helped to ameliorate those problems.[6] The purpose of this report is to present the findings from analyses of those questions.

A. Background

The RECS is a household energy survey that was first conducted in 1978 and has been periodically conducted since that time. (The two most recent surveys conducted in 2001 and 2005). The RECS collects information from households on the energy using characteristics of their housing units and their household. In addition, the survey obtains energy consumption and expenditure data directly from energy suppliers. The RECS furnishes a rich database of energy-related information on households and housing units.[7]

For most of the RECS surveys, HHS provided funding to improve the information available on low income home energy issues, including supplemental samples of low income households and LIHEAP-recipient households to increase the precision of survey estimates, and special questions related to LIHEAP recipiency and the energy-related problems faced by low income households. For the 2005 RECS, HHS funding was used to oversample LIHEAP recipient households, obtain administrative data on LIHEAP recipiency and benefits for survey respondents, and administer a set of questions on energy-related problems. The LIHEAP oversample increased the number of LIHEAP recipient households in the RECS sample from about 200 interviews to 434 interviews. The collection of LIHEAP administrative data furnished higher quality information on LIHEAP recipiency and benefits than the respondent self-reports from previous RECS surveys.[8] The 2005 RECS also included a battery of questions related to home energy problems faced by low income households.

[6] 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).

[7] Information on RECS can be accessed at the EIA website at http://www.eia.doe.gov/emeu/recs/.

[8] The problem with respondent self-reports is that respondents may confuse LIHEAP with other energy assistance programs in the State and may not remember the exact amount of the LIHEAP benefit they received. Finally, respondents generally underreport participation in public assistance programs on surveys.

B. Study Goals

The purpose of this study is to use the 2005 RECS data to develop information on the Energy Insecurity of low income households, including:

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

- Factors Related to Energy Insecurity – An analysis of the factors associated with energy problems including income, energy burden, geographic region and other demographic and housing factors.

- Performance of the Home Energy Insecurity Scale – An assessment of the performance of the Home Energy Insecurity Scale in measuring the impacts of energy costs on low income households compared to other Energy Insecurity measures used in the past.

This study furnishes important information to OCS regarding the performance of LIHEAP, as well as the types of information that OCS should collect to assess the energy needs of low income households.

C. Organization of Report

Four sections follow this introduction.

- Section II – Levels and Types of Energy Insecurity

- Section III – Factors Related to Energy Insecurity

- Section IV – Performance of the Home Energy Insecurity Scale

- Section V – Study Implications

APPRISE prepared this report for the Office of Community Services' Division of Energy Assistance under contract with the Energy Information Administration (*Contract #DE-AM01-04EI4006, Task #DE-DT0000095*). The statements, findings, conclusions, and recommendations are solely those of analysts from APPRISE and do not necessarily reflect the views of EIA or HHS.

II. Level and Types of Energy Insecurity

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

A. Space Heating Disruptions

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

In the 2005 RECS, the following space heating disruption questions were asked.

K-2: Was there ever a time during the last 12 months when you wanted to use your main source of heat, but could not, for one or more of the following reasons:

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

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

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

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

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

Disruption of a household's main source of heat does not necessarily mean that the household is completely without heat. Some heat interruptions are relatively short. For

example, data from the 2001 RECS show 4.3 percent of heat interruptions (question K-3d) were less than two hours. In addition, data from the 2001 RECS show that during 35 percent of heat interruptions, low income households were able to heat their home in some other way. However, a space heating disruption does imply that the household is having significant energy affordability problems.

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

Table II-1 presents data from the 2005 RECS on space heating disruptions for low income households. For each type of space heating disruption, the table shows the number of low income households that experienced that type of disruption, the percent of low income households where reason is applicable[9] that experienced that disruption, and the percent of all low income households that experienced that disruption. Table II-1 shows that 0.3 million low income households that had a space heating disruption due to being *"unable to pay for bulk fuel delivery"* out of about 5.7 million low income households that used a bulk fuel as their main heating fuel, representing 5.3 percent of these households. Table II-1 also shows that such interruptions affected 0.8 percent of the entire population of low income households.

Table II-1
Inability to Use the Main Source of Heat in the Past 12 Months
Low Income Households, 2005

Reason for Space Heating Disruption	Number of Low Income Households	Percent of Low Income Households Where Reason Applicable	Percent of All Low Income Households
Unable to pay for the repair of broken heating system	1,581,233	4.5%	4.4%
Unable to pay for bulk fuel delivery	300,284	5.3%	0.8%
Unable to pay for electric service	1,671,636	4.7%	4.7%
Unable to pay for gas service	621,956	3.8%	1.7%
Disruption due to any reason	3,265,563	9.2%	9.1%

Source: 2005 RECS

Table II-1 shows that between 3.8 percent and 5.3 percent of all main heating fuel groups (electric, gas, and bulk fuels) were unable to use their main source of heat because they were

[9] For example, the reason "*unable to pay for bulk fuel delivery*" is only applicable to those households that have a heating system and heat their home with bulk fuel.

unable to pay for energy service at some time during the winter of 2004-2005. In addition, about 4.5 percent of low income households had a broken main heating system during that winter. In total, over 9 percent of low income households had a space heating disruption.

Some households use natural gas or a bulk fuel as their main source of heat, but are unable to use their heating equipment because they have lost their electric service. The 2005 RECS shows that about 300,000 households that heat with natural gas or a bulk fuel were unable to use their main source of heat because they lost their electric service. This is about 12 percent of the main heat disruptions for gas and bulk fuel main heaters.

Table II-2 furnishes data from the series of RECS surveys regarding the number of low income households that have reported space heating payment disruptions over time. These statistics show that during the winter of 2004-2005 space heating disruptions were the highest of any year since the question was first asked in the 1984 RECS.[10]

Table II-2
Inability to Use the Main Source of Heat
Because of Payment Problems in the Past 12 Months
Low Income Households, Selected Years

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

Source: FY 2007 LIHEAP Home Energy Notebook and 2005 RECS

B. Air Conditioning Disruptions

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

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

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

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

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

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

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

Table II-3 presents data from the 2005 RECS on air conditioning disruptions for low income households. For each type of air condition disruption, the table shows the number of low income households that experienced that type of disruption, the percent of eligible households that experienced that disruption, and the percent of all low income households that experienced that disruption. The percent reason applicable to experience a particular type of disruption is based on the number of households that have air conditioning. Table II-3 shows that 2.5 million low income households had that disruption out of 28.7 million low income households that have air conditioning equipment, representing 8.7 percent of the these households. Table II-3 also shows that such interruptions affected 7.0 percent of the entire population of low income households.

Table II-3
Inability to Use Air Conditioning in the Past 12 Months
Low Income Households, 2005

Reason for Air Conditioning Disruption	Number of Low Income Households	Percent of Low Income Households Where Reason Applicable	Percent of All Low Income Households
Unable to pay for the repair of broken heating system	1,427,509	4.9%	4.0%
Unable to pay for electric service	1,240,278	4.3%	3.5%
Disruption due to any reason	2,507,547	8.7%	7.0%

Source: 2005 RECS

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

C. LIHEAP's Role in Restoring Home Heating and Cooling[11]

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

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

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

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

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

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

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

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

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

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

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

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

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

[11] In Section 2C of the report, LIHEAP recipiency is self-reported by the survey respondents. In other parts of the report, LIHEAP recipient households refer to those survey respondents that were verified to be LIHEAP recipients using State administrative LIHEAP records.

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

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

Table II-4 furnishes information on the helpfulness of LIHEAP in restoring home heating for the households that reported receiving LIHEAP assistance. The results indicate that LIHEAP benefits were very important in restoring heat for the households that experienced heating interruptions. Of the households that reported receiving LIHEAP, 69 percent that had heating interruption because of the inability to pay for electric service reported that receiving LIHEAP restored their home heating. Of the households that reported receiving LIHEAP, all that had a heating interruption because of the inability to pay for bulk fuel reported that receiving LIHEAP restored their home heating.

Table II-4
Heating Interruption: LIHEAP's Role in Restoring Service, 2005
Households Reporting LIHEAP Receipt

Reason for Heating Interruption	Did Receiving LIHEAP Restore Heating?			
	YES		NO	
	Number	Percentage	Number	Percentage
Unable to pay for the repair of broken heating system	176,301	42%	241,265	58%
Unable to pay for bulk fuel delivery	103,646	100%	0	0%
Unable to pay for electric service	322,077	69%	144,775	31%
Unable to pay for gas service	126,034	51%	119,293	49%

Source: 2005 RECS

Table II-5 presents information on the percent of all low income households that LIHEAP restored home heating. The table shows that LIHEAP restored home heating for 11 percent of all low income households that had a heating interruption because of a broken heating system. Twenty percent of all low income households that had a heating interruption because of the inability to pay for gas service had their heating restored by LIHEAP.

Table II-5
Heating Interruptions: LIHEAP's Role in Restoring Service, 2005
All Low Income Households

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

Source: 2005 RECS

Table II-6 reports on the helpfulness of LIHEAP in restoring home cooling for the households that reported receiving LIHEAP. The results indicate that LIHEAP restored home cooling for about 200 thousand households that had their electric service discontinued. However, LIHEAP restored home cooling for very few households that had a cooling interruption because of the inability to pay for the broken cooling equipment.

Table II-6
Cooling Interruptions: LIHEAP's Role in Restoring Service, 2005
Households Reporting LIHEAP Receipt

Reason for Heating Interruption	Did Receiving LIHEAP Restore Cooling?			
	YES		NO	
	Number	Percentage	Number	Percentage
Unable to pay for the repair of broken air conditioner	4,084	2%	183,398	98%
Unable to pay for electric service	200,029	63%	119,269	37%

Source: 2005 RECS

Table II-7 presents information on the percent of all low income households that LIHEAP restored home cooling. The table shows that LIHEAP restored home heating for 16 percent of all low income households that had a cooling interruption because of inability to pay for electric service.

Table II-7
Cooling Interruptions: LIHEAP's Role in Restoring Service, 2005
All Low Income Households

Reason for Cooling Interruption	Number of Low Income Households	Number of Low Income Households LIHEAP Restored Cooling	Percent of All Low Income Households LIHEAP Restored Cooling
Unable to pay for the repair of broken air conditioner	1,427,509	4,084	0%
Unable to pay for electric service	1,240,278	200,029	16%

Source: 2005 RECS

D. Electric Service Disruptions

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

E. Financial Dimensions of Energy Insecurity

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

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

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

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

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

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

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

Table II-8 presents data from the 2005 RECS on the financial elements of Energy Insecurity for low income households. For each type of financial insecurity, the table shows the percent of low income households that experienced that type of financial Energy Insecurity. Table II-8 shows that 57.8 percent of low income households had at least one type of financial insecurity during the past 12 months.

The most common types of financial insecurity are "worry about their ability to pay" and "reduce spending for basic necessities." Almost half of low income households indicated that they experienced that insecurity at least once during 2005. However, it is interesting to note that about 43 percent of households say that they "worried about their ability to pay" and they "reduce spending for basic necessities," while seven percent of households report that they "worry" but that they didn't "reduce spending" and another seven percent say that they "reduce spending" but did not "worry about their ability to pay."

It is common for low income households to borrow money to pay their energy bills, skip paying at least one bill, and receive service termination threats. About 25 percent of low income households report experiencing that Energy Insecurity at some time during 2005.

Table II-8
Financial Energy Insecurity in the Past 12 Months
Low Income Households, 2005

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

Source: 2005 RECS

An analysis of the relationship among the financial dimensions of Energy Insecurity shows that low income households adopt different strategies for addressing Energy Insecurity problems.

- Almost all of the households that borrow to pay energy bills, skip paying a bill, or receive a service termination threat, report that they reduce spending on necessities.

For example, about 25 percent of households say that they had to borrow to pay their energy bill. Of those who borrow, 84 percent said that they had to reduce spending for basic necessities. Similarly, of the households that say that they received a service termination notice, 85 percent reported that they had to reduce spending for basic necessities.

- It appears that some households borrow money to avoid skipping a payment or receiving a service termination notice. About one-third of households that reported borrowing did not need to skip paying a bill and - about half of low income households that borrowed to pay their bill did not have a service termination notice.

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

F. Health and Safety Dimensions of Energy Insecurity

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

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

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

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

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

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

Table II-9 presents data from the 2005 RECS on the health and safety elements of Energy Insecurity for low income households. For each type of health and safety insecurity, the table shows the percent of low income households indicating how often they experienced that type of financial Energy Insecurity. Table II-9 shows that 26.0 percent of low income households had at least one type of health and safety insecurity during the past 12 months.

Table II-9
Health and Safety Energy Insecurity in the Past 12 Months
Low Income Households, 2005

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

Source: 2005 RECS

The most commonly reported type of Energy Insecurity is "closing off part of your home." However, for each of the listed types of Energy Insecurity, close to 10 percent of low income households report experiencing the problem. The health and safety problems do seem to be somewhat independent of each other. For example, of the 10 percent of households report that they used their kitchen stove for heat, about one-third report that they also had to keep their home at an unsafe temperature.

G. Correlation Among Types of Energy Insecurity

It is important to understand the relationships among the different dimensions of Energy Insecurity. The most obvious relationship is between financial Energy Insecurity and heating or cooling disruptions. However, it also is important to assess whether there is a direct relationship between financial Energy Insecurity and Energy Insecurity related to health and safety.

The RECS data show that households with financial Energy Insecurity "almost every month" are far more likely to have heating or cooling service disruptions than other types of households. Table II-10 shows that almost one-fourth of households that have financial Energy Insecurity "almost every month" report that they had a heating service disruption, while only about 10 percent of households that have financial insecurity "some months" or "one or two months" have a heating disruption. About 60 percent of all heating disruptions are among households that have financial Energy Insecurity "almost every month." Similarly, Table II-11 shows that 55% of air conditioning disruptions are among households that have financial Energy Insecurity "almost every month."

Table II-10
Relationship of Financial Energy Insecurity to Heating Service Disruptions
Low Income Households, 2005

Frequency of Financial Energy Insecurity	No Heating Disruption	Any Heating Disruption	Heating Disruption Rate
Almost Every Month	20.0%	5.9%	23%
Some Months	24.0%	3.2%	12%
One or Two Months	7.8%	0.7%	8%
Never	38.0%	0.5%	1%
ALL	89.7%	10.3%	10%

Source: 2005 RECS

Table II-11
Relationship of Financial Energy Insecurity to Air Conditioning Disruptions
Low Income Households, 2005

Frequency of Financial Energy Insecurity	No Air Conditioning Disruption	Any Air Conditioning Disruption	Air Conditioning Disruption Rate
Almost Every Month	21.2%	4.9%	19%
Some Months	24.1%	3.2%	13%
One or Two Months	8.0%	0.6%	7%
Never	38.0%	0.2%	1%
ALL	91.2%	8.8%	9%

Source: 2005 RECS

The RECS data also show that households with financial Energy Insecurity "almost every month" are far more likely to have health or safety Energy Insecurity. Table II-12 shows that half of the households that have financial Energy Insecurity "almost every month" also report that they had health and safety Energy Insecurity. By comparison, among those low income households that have no indicators of financial Energy Insecurity, only 7 percent have a health and safety Energy Insecurity.

Table II-12
Relationship of Financial Energy Insecurity to Health and Safety Energy Insecurity
Low Income Households, 2005

Frequency of Financial Energy Insecurity	Any Health and Safety Problem	No Health and Safety Problem	Health and Safety Energy Insecurity Rate
Almost Every Month	13.0%	13.0%	50%
Some Months	11.4%	16.6%	42%
One or Two Months	1.9%	6.6%	22%
Never	2.7%	35.9%	7%
ALL	28.0%	72.0%	28%

Source: 2005 RECS

The RECS data show that the intensity of health and safety Energy Insecurity, as measured by the frequency of health and safety Energy Insecurity, is also correlated with heating and air conditioning disruptions. Tables II-13 and II-14 show that about 27 percent of low income households that have health and safety Energy Insecurity "almost every month" have a heating disruption and 30 percent have a cooling disruption.

Table II-13
Relationship of Health and Safety Energy Insecurity to Heating Service Disruptions
Low Income Households, 2005

Frequency of Health and Safety Energy Insecurity	No Heating Disruption	Any Heating Disruption	Heating Disruption Rate
Almost Every Month	4.6%	1.7%	27%
Some Months	10.9%	2.9%	21%
One or Two Months	6.2%	1.7%	21%
Never	68.0%	4.0%	6%
ALL	89.7%	10.3%	10%

Source: 2005 RECS

Table II-14
Relationship of Health and Safety Energy Insecurity to Air Conditioning Disruptions
Low Income Households, 2005

Frequency of Health and Safety Energy Insecurity	No Air Conditioning Disruption	Any Air Conditioning Disruption	Air Conditioning Disruption Rate
Almost Every Month	4.3%	1.8%	30%
Some Months	10.5%	2.1%	20%
One or Two Months	7.2%	1.3%	15%
Never	69.2%	3.7%	5%
ALL	91.2%	8.8%	9%

Source: 2005 RECS

In total, about 13 percent of low income households have either a heating or air conditioning disruption; 4.0 percent have a heating disruption only, 2.9 percent have an air conditioning disruption only, and 5.9 percent have both a heating and an air conditioning disruption.

H. Summary of Findings

The analysis of the 2005 RECS Energy Insecurity data finds that the series of questions help to better flesh out the energy affordability problems faced by low income households. The data on different types of Energy Insecurity (heating disruptions, air conditioning disruptions, financial Energy Insecurity, and health and safety Energy Insecurity) and the intensity measures of Energy Insecurity almost every month, some months, one or two months, or never) serve to broaden the understanding of energy affordability problems. Key findings include:

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

- Overlap – Some households faced only one type of problem; but many others experienced multiple problems during the year.

- Intensity – The intensity of any dimension of Energy Insecurity was directly related to the number of types of Energy Insecurity faced by a low income household.

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

III. Factors Related to Energy Insecurity

Section II presented information on the incidence of each type of Energy Insecurity and the relationship among the different types of Energy Insecurity. This section furnishes detailed information on how Energy Insecurity levels vary for key population subgroups.

A. Definition of Analysis Factors

The factors reviewed in this section include:

1. Geography – The geographic dimension considered is Census Region.

2. Poverty – The analysis uses the HHS Poverty Guidelines as one way of defining income. The poverty levels examined include at or below the 100% of the poverty guidelines, above 100% but at or below 150%, and above 150% but at or below 60% of State median income. (Note: In the 2005 RECS, households were eligible for Section K - the Energy Insecurity questions - if their income was at or below the Federal Maximum Eligibility Standard for their State.)

3. Income – The analysis also uses income groups based on reported household income. Households are categorized as having annual household income at or below $10,000, above $10,000 but at or below $20,000, and $20,000 or more. (Note: Households with income that is above the Federal Maximum Income Standard for their State are excluded from the analysis because they were not asked the Section K questions.)

4. Income Type – Based on reported sources of income households are categorized into four income groups:

    - Employed – Households that reported receiving some income from wages or self-employment.

    - Retired – Households that did not report receiving employment income, but did report receiving retirement income such as Social Security or pensions.

    - Public Assistance – Households that did not report receiving employment income or retirement income, but did report receiving public assistance.

    - Other – Households that did not report receiving employment income, retirement income, or public assistance income.

5. Vulnerability Group – Households are categorized into the following vulnerability groups.

- Young Child – A household is categorized as young child if one or more individuals in the home is 5 years or younger. (Note: If a household contains both an elderly and young child member, it is categorized as Young Child.)[12]

- Elderly – A household is categorized as elderly if one or more individuals in the home are aged 60 years or older and there is no young child in the household.

- Other – A household is categorized as other if there is no elderly individual and no young child in the home.[13] -

6. Energy Burden – For the purpose of the study, households are categorized as having high energy burden if residential energy burden is greater than 10.9 percent (i.e., if annual energy expenditures are greater than 10.9 percent of annual income), as having moderate energy burden if energy burden is less 10.9 percent, but greater than or equal to 6.5 percent, and low if energy burden is less than 6.5 percent.[14]

7. LIHEAP Status – In the 2005 RECS, survey respondents were checked against State LIHEAP administrative records to assess whether they had received LIHEAP.

These factors are used to examine how Energy Insecurity is distributed geographically and demographically for the population of low income households.

B. Energy Insecurity by Geography

Tables III-1 through III-5 present information on the geographic dimensions of Energy Insecurity for LIHEAP income eligible households. The 2005 RECS estimates that there were 38.6 million households that were income eligible for LIHEAP. Of these households, 8.1 million live in the Northeast, 9.4 million in the Midwest, 13.9 million in the South, and 7.2 million in the West census regions. The statistics presented here are for the households that responded to the Section K questions, representing 35.9 million of the 38.6 million low income households.[15]

Table III-1 shows that in 2005, 9.2 percent of LIHEAP income eligible households were without heat at some point during the year. This corresponds to about 3.6 million households. Heat interruptions tend to occur at a higher rate in the South and West Census Regions regardless of the underlying reason. In 2005, 13.4 percent (1.0 million) of households in the West and 10.3 percent (1.4 million) of households in the South went without heat in 2005. The lower incidence of heat interruptions in the Northeast and

[12] According to the 2005 RECS, there are about 470 thousand low income households that contain both elderly and young child members.
[13] Note that LIHEAP also considers disabled individuals to be vulnerable. However, the 2005 RECS did not collect information on disability.
[14] *LIHEAP Energy Burden Evaluation Study*, March 2005, prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.
[15] Section K questions were not asked to some of the households that did not answer the household income question but later turned out to be income eligible for LIHEAP after their household income was imputed.

Midwest may be due to utility shutoff protection laws that are in effect in most states in these regions. However, this does not explain the lower incidence of heat disruptions in these regions for households using delivered fuels. Table III-1 also shows that equipment interruptions are as important as payment interruptions.

Table III-1
Heat Interruption: Inability to Use the Main Source of Heat in the Past 12 Months
By Census Region, 2005

Reason for Heat Interruption	Census Region				U.S.
	Northeast	Midwest	South	West	
Unable to pay for the repair of broken heating system (households with heating equipment)	4.3%	2.5%	3.8%	8.5%	4.5%
Unable to pay for bulk fuel delivery (households with bulk fuel main heat)	3.3%	3.1%	9.1%	8.2%	5.3%
Unable to pay for electric service (households with heating equipment)	3.5%	3.9%	5.7%	5.3%	4.7%
Unable to pay for gas service (households with gas main heat)	1.3%	4.5%	5.2%	3.8%	3.8%
Heat Interruption due to any of the four reasons (all households)	6.9%	6.5%	10.3%	13.4%	9.2%

Source: 2005 RECS

Table III-2 focuses on the type of service interruptions. In 2005, 9.2 percent of LIHEAP income eligible households were without heating at some point during the heating season and 8.7 percent were without air conditioning at some point during the cooling season. Eleven and half percent of LIHEAP income eligible households (4.4 million) experienced at least one type of service interruption. Both heating and cooling disruptions occurred at the highest rate in the South and West.

Table III-2
Type of Service Interruption in the Past 12 Months
By Census Region, 2005

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

Source: 2005 RECS

Table III-3 focuses on the category of service interruptions. For most Census Regions, home energy service interruptions are almost equally split between payment interruptions and equipment interruptions. However, in the West, equipment interruptions are responsible for substantially more service disruptions than payment interruptions.

Table III-3
Category of Service Interruption in the Past 12 Months
By Census Region, 2005

Category of Interruption	Census Region				U.S.
	Northeast	Midwest	South	West	
Payment Only	2.4%	3.9%	6.7%	4.8%	4.8%
Equipment/System Only	2.8%	3.4%	5.9%	7.7%	5.0%
Both	1.9%	1.5%	2.1%	1.5%	1.8%

Source: 2005 RECS

Table III-4 furnishes information on the financial dimensions of Energy Insecurity introduced in Section II of the report. The analysis presented in Section II found that there was a high level of correlation (correlation coefficient =0.71) between the first two dimensions of financial Energy Insecurity – worry about the ability to pay for home energy bills and reducing expenditures for basic necessities. For that reason, this analysis examines the information on reducing expenditures for basic necessities. Similarly, there was considerable correlation among the dimensions of borrowing to pay the home energy bill, skipping a home energy payment, and receiving a threat of service disconnection. This analysis focuses on the threat of service termination.

Table III-4 focuses on the constraints households face on household necessities or whether they received shutoff notices or threats by region. Nationally, 47 percent (18.1 million) of LIHEAP income eligible households reduced expenditures on basic household necessities to pay for their energy bills in 2005; 20.8 percent (8.0 million) of LIHEAP income eligible households received a notice or threat to discontinue their heating service. Table III-4 shows that households in the Northeast are the least likely to reduce expenses for household necessities due to not having enough money for their energy bill. They are also least likely to receive shutoff notices.

The pattern for the *intensity* of financial problems appears to be the same in all Census Regions. For example, in all Census Regions, we find that a significant fraction of households have to reduce spending on necessities every month, another group of households has to reduce spending on necessities in some months (perhaps during those months with the highest bills), and relatively few households have problems only one or two months per year. For service termination threats, very few households have them every month, while large numbers report having them in some months or in one or two months. Given the substantial differences in the type of protections across the country, as well as the differences in the way energy bills vary during different seasons, it is interesting that the patterns of problems are so similar.

Table III-4
Financial Dimensions of Energy Insecurity in the Past 12 Months
By Census Region, 2005

Dimension	Frequency	Census Region				U.S.
		Northeast	Midwest	South	West	
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	12.4%	15.7%	20%	18.1%	17.0%
	Some Months	20.5%	27.3%	22.9%	22.0%	23.3%
	1 or 2 Months	6.1%	6.3%	6.7%	8.0%	6.7%
	Never / No	61.0%	50.7%	50.5%	51.8%	53.0%
Received Notice or Threat to Disconnect or Discontinue Electricity or Home Heating Fuel Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	2.3%	2.1%	3.8%	1.6%	2.7%
	Some Months	6.1%	9.3%	9.2%	9.6%	8.7%
	1 or 2 Months	7.4%	10.5%	9.6%	10.3%	9.5%
	Never / No	84.3%	78.1%	77.4%	78.6%	79.2%

Source: 2005 RECS

Table III-5 furnishes information on the health and safety dimensions of Energy Insecurity by Census Region. This analysis presents information on three important aspects of health and safety Energy Insecurity – keeping the home at an unsafe temperature, leaving the home for part of the day, and using the kitchen stove or oven for heat. Nationally, 8.4 percent (3.2 million) of LIHEAP income eligible households reported that they kept their home at an unsafe temperature, 10.1 percent (3.8 million) used kitchen stove or oven to provide heat, and 8.8 percent (3.4 million) left home during day because it was too hot or cold for at least 1 or 2 months. The overlapping between these three actions is relatively low. Only 0.4 million of households took all three actions and 1.8 million took any two of the three actions. 20 percent (7.7million) of LIHEAP income eligible households engaged in at least one of the three actions. This is the total number of households that faced a constraint on energy use because of unaffordable energy.

At the Census Region level, households in the Northeast Region are the least likely to experience any of these types of health and safety Energy Insecurity. Households in the South Region were the most likely to keep their home at an unsafe temperature and to use their kitchen stove or oven for heat. Households in the West Region were the most likely to leave their home for part of the day because it was too hot or too cold.

Table III-5
Health and Safety Dimensions of Energy Insecurity in the Past 12 Months
By Census Region, 2005

Dimension	Frequency	Census Region				U.S.
		Northeast	Midwest	South	West	
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	1.3%	1.0%	2.8%	1.5%	1.8%
	Some Months	2.6%	4.0%	4.9%	4.2%	4.1%
	1 or 2 Months	1.8%	3.5%	2.5%	2.0%	2.5%
	Never / No	94.3%	91.5%	89.9%	92.3%	91.6%
Used Kitchen Stove or Oven to Provide Heat Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	0.5%	0.1%	1.6%	0%	0.7%
	Some Months	3.6%	4.6%	5.3%	5.9%	4.9%
	1 or 2 Months	3.0%	5.5%	5.2%	3.5%	4.5%
	Never / No	92.9%	89.8%	87.9%	90.6%	89.9%
Left Home for Part of the Day Because it was Too Hot or Too Cold Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	1.4%	0.2%	1.3%	1.2%	1.0%
	Some Months	3.0%	2.9%	3.5%	8.2%	4.2%
	1 or 2 Months	2.1%	3.5%	3.5%	5.4%	3.6%
	Never / No	93.4%	93.4%	91.7%	85.2%	91.2%

Source: 2005 RECS

C. Energy Insecurity by Poverty Level and Income Group

Tables III-6 through III-10 present information on the income dimensions of Energy Insecurity for LIHEAP income eligible households. Table III-6 shows that in 2005, households with income at or below the HHS Poverty Guidelines had the highest rate of heat interruptions of all types – 12.9 percent. Similarly, the lowest income households – those with incomes less than $10,000 were the most likely to have heat interruptions.

Table III-6
Heat Interruption: Inability to Use the Main Source of Heat in the Past 12 Months
By Poverty Level and Income, 2005

Reason for Heat Interruption	Poverty Level			Annual Income		
	<=100%	101%-150%	>150%	<$10K	$10K-<$20K	>=$20K
Unable to pay for the repair of broken heating system	6.3%	3.4%	2.5%	7.0%	3.3%	3.9%
Unable to pay for bulk fuel delivery	7.2%	4.4%	2.7%	5.4%	4.3%	6.7%
Unable to pay for electric service	6.6%	4.1%	2.1%	6.4%	3.8%	4.6%
Unable to pay for gas service	5.1%	3.1%	2.8%	3.6%	1.9%	6.1%
Heat Interruption due to any of the four reasons	12.9%	7.0%	5.5%	12.9%	6.2%	10.1%

Source: 2005 RECS

Table III-7 focuses on the type of service interruptions. Households with incomes at or below poverty and households with incomes at or below $10,000 had the highest rates for both heating and cooling interruptions. However, the rates of heating and/or cooling interruptions are significant for all LIHEAP income eligible households. About 10.0 percent of households with incomes between 101 and 150 percent of poverty and 8.3 percent of income eligible households with incomes above 150 percent of poverty had heating and/or cooling interruptions.

Table III-7
Type of Service Interruption in the Past 12 Months
By Poverty Level and Income, 2005

Type of Interruption	Poverty Level			Annual Income		
	<=100%	101%-150%	>150%	<$10K	$10K-<$20K	>=$20K
Heating Interruption	12.9%	7.0%	5.5%	12.9%	6.2%	10.1%
Cooling Interruption	10.1%	8.6%	6.1%`	10.2%	6.8%	9.8%
Any Interruption	14.5%	10.0%	8.3%	14.3%	8.4%	13.3%

Source: 2005 RECS

Table III-8 focuses on the category of service interruptions. The lowest income households have higher rates of payment only heating and cooling disruptions, as well as much higher

rates of both payment and system interruptions. The differences in the rates of equipment only disruptions are smaller than for payment interruptions.

Table III-8
Category of Service Interruption in the Past 12 Months
By Poverty Level and Income, 2005

Category of Interruption	Poverty Level			Annual Income		
	<=100%	101%-150%	>150%	<$10K	$10K-<$20K	>=$20K
Payment Only	6.1%	3.4%	4.3%	4.4%	3.8%	6.3%
Equipment/System Only	5.4%	5.4%	3.6%	6.6%	3.2%	5.9%
Both	3.0%	1.2%	0.4%	3.3%	1.5%	1.1%

Source: 2005 RECS

Table III-9 furnishes information on the financial dimensions of Energy Insecurity introduced in Section II of the report. Table III-9 focuses on whether households reduced expenses on household necessities and/or whether they received shutoff notices or threats. The table shows that the lowest income households are the most likely to reduce spending for basic necessities (53 percent) and the most likely to receive a service termination notice (26 percent). However, a significant share of other LIHEAP income eligible households also reduce spending and have service termination threats.

Table III-9
Financial Dimensions of Energy Insecurity in the Past 12 Months
By Poverty Level and Income, 2005

Dimension	Frequency	Poverty Level			Annual Income		
		<=100%	101%-150%	>150%	<$10K	$10K-<$20K	>=$20K
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	22.4%	14.1%	11.2%	23.8%	15.1%	14.0%
	Some Months	22.3%	26.2%	20.8%	20.1%	21.8%	27.7%
	1 or 2 Months	8.0%	5.6%	6.0%	5.6%	6.1%	8.5%
	Never / No	47.3%	54.2%	62.1%	50.5%	57.0%	49.9%
Received Notice or Threat to Disconnect or Discontinue Electricity or Home Heating Fuel Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	3.9%	1.4%	2.1%	4.6%	2.2%	1.7%
	Some Months	11.5%	6.6%	6.1%	11.4%	7.6%	7.8%
	1 or 2 Months	10.7%	9.5%	7.2%	9.0%	8.0%	11.8%
	Never / No	73.8%	82.5%	84.5%	74.9%	82.3%	78.7%

Source: 2005 RECS

Table III-10 furnishes information on the health and safety dimensions of Energy Insecurity by Census Region. This analysis presents information on three important aspects of health and safety Energy Insecurity – keeping the home at an unsafe temperature, leaving the home for part of the day, and using the kitchen stove or oven for heat. This table shows that households at the lowest income level have the highest rate of health and safety Energy Insecurity. For example, about 12 percent of households with income at or below poverty report that they kept their home at a temperature that they felt was unsafe, while only about 4 percent of the households with income above 150 percent of poverty reported that. The rates of health and safety Energy Insecurity is generally 10 percent of the lowest income households and 5 percent of less for the other LIHEAP income eligible households.

Table III-10
Health and Safety Dimensions of Energy Insecurity in the Past 12 Months
By Poverty Level and Income, 2005

Dimension	Frequency	Poverty Level			Annual Income		
		<=100%	101%-150%	>150%	<$10K	$10K-<$20K	>=$20K
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	2.9%	0.6%	1.3%	3.9%	1.3%	0.7%
	Some Months	5.4%	4.3%	1.2%	5.3%	4.9%	2.2%
	1 or 2 Months	3.8%	1.3%	2.0%	4.0%	2.7%	1.1%
	Never / No	87.9%	93.7%	95.6%	86.9%	91.2%	96.0%
Used Kitchen Stove or Oven to Provide Heat Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	0.9%	0.9%	0.0%	0.5%	0.7%	0.9%
	Some Months	7.2%	3.3%	2.7%	6.6%	5.4%	2.9%
	1 or 2 Months	5.6%	4.1%	2.9%	5.5%	4.8%	3.3%
	Never / No	86.3%	91.7%	94.4%	87.4%	89.2%	92.9%
Left Home for Part of the Day Because it was Too Hot or Too Cold Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	1.2%	0.5%	1.6%	1.6%	1.2%	0.4%
	Some Months	5.4%	3.2%	3.3%	6.0%	4.5%	2.4%
	1 or 2 Months	4.4%	3.7%	1.8%	4.1%	3.3%	3.6%
	Never / No	89.0%	92.6%	93.3 %	88.4%	91.0%	93.7%

Source: 2005 RECS

D. Energy Insecurity by Vulnerability Group and Income Type

Tables III-11 through III-15 present information on the demographic dimensions of Energy Insecurity for LIHEAP income eligible households. Table III-11a shows that in 2005, elderly households were the least likely to report heating interruptions; about 5.5 percent of elderly households had a heating interruption, while 13.1 percent households with a young child and 10.6 percent of other households reported a heating interruption. However, Table III-11b shows that for households with income at or below poverty, the heat interruptions reported by elderly households are much more comparable to those of other types of households. However, even in Table III-11b, it can be seen that the major types of heat interruptions for elderly households are from equipment problems and bulk fuel payment issues. Very few elderly households report electric service or gas service heat interruptions.

Table III-11a
Heat Interruption: Inability to Use the Main Source of Heat in the Past 12 Months
By Vulnerability Group and Income Type, 2005
All LIHEAP Income Eligible Households

Reason for Heat Interruption	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Unable to pay for the repair of broken heating system	6.1%	4.2%	3.9%	4.1%	3.6%	7.4%
Unable to pay for bulk fuel delivery	5.7%	4.4%	6.5%	5.9%	4.0%	6.6%
Unable to pay for electric service	7.3%	1.7%	6.1%	5.6%	2.2%	6.0%
Unable to pay for gas service	6.2%	0.5%	5.4%	4.6%	0.9%	6.1%
Heat Interruption due to any of the four reasons	13.1%	5.5%	10.6%	10.0%	5.2%	13.3%

Source: 2005 RECS

Table III-11b
Heat Interruption: Inability to Use the Main Source of Heat in the Past 12 Months
By Vulnerability Group and Income Type, 2005
Households with Income at or Below the HHS Poverty Guidelines

Reason for Heat Interruption	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Unable to pay for the repair of broken heating system	6.1%	8.0%	5.1%	5.6%	6.5%	7.9%
Unable to pay for bulk fuel delivery	1.3%	6.2%	11.0%	7.9%	7.5%	4.8%
Unable to pay for electric service	7.3%	1.5%	10.4%	8.2%	3.4%	6.5%
Unable to pay for gas service	3.6%	0.0%	10.7%	7.1%	0.8%	5.6%
Heat Interruption due to any of the four reasons	12.6%	9.2%	16.2%	14.1%	9.5%	14.4%

Source: 2005 RECS

Table III-12a focuses on the type of service interruptions. Elderly households have the lowest rate of both heating and cooling interruptions. However, Table III-12b shows that the interruption rates for elderly households with incomes at or below poverty are much closer to those of other types of households.

Table III-12a
Type of Service Interruption in the Past 12 Months
By Vulnerability Group and Income Type, 2005
All LIHEAP Income Eligible Households

Type of Interruption	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Heating Interruption	13.1%	5.5%	10.6%	10.0%	5.2%	13.3%
Cooling Interruption	13.1%	5.3%	9.5%	10.0%	4.2%	11.6%
Any Interruption	15.5%	6.9%	13.7%	12.9%	6.4%	15.7%

Source: 2005 RECS

Table III-12b
Type of Service Interruption in the Past 12 Months
By Vulnerability Group and Income Type, 2005
Households with Income at or Below the HHS Poverty Guidelines

Type of Interruption	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Heating Interruption	12.6%	9.2%	16.2%	14.1%	9.5%	14.4%
Cooling Interruption	12.2%	7.5%	11.2%	11.5%	5.7%	12.7%
Any Interruption	14.3%	10.5%	18.0%	16.1%	10.7%	15.5%

Source: 2005 RECS

Tables III-13a and III-13b focus on the category of service interruptions. LIHEAP income eligible elderly households have the lowest rate of payment interruptions. Among households with income below poverty, elderly households are also the least likely to have payment interruptions. However, elderly households have a higher rate of equipment interruptions, and Table III-13b shows that elderly households with income below poverty have the highest rate of equipment interruptions.

Table III-13a
Category of Service Interruption in the Past 12 Months
By Vulnerability Group and Income Type, 2005
All LIHEAP Income Eligible Households

Category of Interruption	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Payment Only	6.5%	0.8%	7.3%	6.1%	1.0%	6.5%
Equipment/System Only	6.6%	5.0%	4.2%	4.9%	3.9%	7.3%
Both	2.4%	1.1%	2.1%	1.9%	1.5%	1.9%

Source: 2005 RECS

Table III-13b
Category of Service Interruption in the Past 12 Months
By Vulnerability Group and Income Type, 2005
Households with Income at or Below the HHS Poverty Guidelines

Category of Interruption	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Payment Only	5.5%	0.0%	11.4%	7.9%	1.5%	7.4%
Equipment/System Only	6.1%	8.4%	2.5%	4.2%	6.5%	6.8%
Both	2.6%	2.1%	4.1%	4.0%	2.7%	1.3%

Source: 2005 RECS

Table III-14a furnishes information on the financial dimensions of Energy Insecurity introduced in Section II of the report (i.e., constraints households face on household necessities or whether they received shutoff notices or threats). The table shows that the elderly households are less likely to reduce spending for basic necessities and are the least likely to receive a service termination notice. The table also shows that employed households face similar levels of financial Energy Insecurity as households on public assistance. Table III-14b presents statistics for all households in poverty. That table shows that, even for elderly households in poverty, such households are much less likely than other types of households to receive threats of service termination. However, elderly households with incomes below poverty report that they need to reduce spending for basic necessities at almost the same rate as other types of households.

Table III-14a
Financial Dimensions of Energy Insecurity in the Past 12 Months
By Vulnerability Group and Income Type, 2005
All LIHEAP Income Eligible Households

Dimension	Frequency	Vulnerability Group			Income Type		
		Young Child	Elderly	Other	Employed	Retired	Cash Assistance and Other
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	16.7%	13.9%	19.9%	16.5%	12.7%	26.8%
	Some Months	26.4%	18.3%	25.9%	26.0%	18.3%	21.3%
	1 or 2 Months	12.4%	4.4%	6.0%	7.6%	6.1%	4.3%
	Never / No	44.5%	63.5%	48.1%	49.9%	62.9%	47.6%
Received Notice or Threat to Disconnect or Discontinue Electricity or Home Heating Fuel Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	1.9%	1.9%	3.7%	2.8%	1.5%	4.1%
	Some Months	8.5%	3.7%	13.0%	10.3%	2.5%	13.3%
	1 or 2 Months	16.2%	2.9%	12.0%	12.1%	2.7%	11.3%
	Never / No	73.5%	91.6%	71.4%	74.8%	93.3%	71.3%

Source: 2005 RECS

Table III-14b
Financial Dimensions of Energy Insecurity in the Past 12 Months
By Vulnerability Group and Income Type, 2005
Households with Income at or Below the HHS Poverty Guidelines

Dimension	Frequency	Vulnerability Group			Income Type		
		Young Child	Elderly	Other	Employed	Retired	Cash Assistance and Other
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	18.9%	20.3%	26.0%	18.1%	21.4%	33.4%
	Some Months	24.0%	21.1%	22.4%	24.6%	20.3%	19.3%
	1 or 2 Months	12.9%	6.1%	6.9%	9.6%	9.1%	3.0%
	Never / No	44.2%	52.5%	44.7%	47.7%	49.2%	44.2%
Received Notice or Threat to Disconnect or Discontinue Electricity or Home Heating Fuel Due to Not Having Enough Money for the Energy Bill During the Past Year	Almost Every Month	3.6%	3.5%	4.5%	3.9%	3.3%	4.8
	Some Months	10.3%	5.2%	17.4%	13.4%	4.0%	16.3%
	1 or 2 Months	15.0%	3.1%	14.6%	12.5%	4.6%	13.7%
	Never / No	71.0%	88.3%	63.5%	70.2%	88.2%	65.2%

Source: 2005 RECS

Tables III-15a and 15b furnish information on the health and safety dimensions of Energy Insecurity. This analysis presents information on three important aspects of health and safety Energy Insecurity – keeping the home at an unsafe temperature, leaving the home for part of the day, and using the kitchen stove or oven for heat. This table shows that all vulnerable groups experience these problems at about the same rate. For example, 6.5 percent of young child households, 9.0 percent of elderly households and 8.7 percent of other households reported that they kept their home at a temperature that they felt was unsafe. A similar pattern is observed for households with income at or below the poverty level, all vulnerable groups and all income type groups have similar rates of health and safety Energy Insecurity.

Table III-15a
Health and Safety Dimensions of Energy Insecurity in the Past 12 Months
By Vulnerability Group and Income Type, 2005
All LIHEAP Income Eligible Households

Dimension	Frequency	Vulnerability Group			Income Type		
		Young Child	Elderly	Other	Employed	Retired	Cash Assistance and Other
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	**Almost Every Month**	1.1%	2.7%	1.3%	1.6%	2.3%	1.6%
	Some Months	3.8%	3.6%	4.7%	4.1%	3.5%	5.3%
	1 or 2 Months	1.6%	2.8%	2.8%	2.4%	2.8%	2.6%
	Never / No	93.5%	91.0%	91.3%	92.0%	91.4%	90.5%
Used Kitchen Stove or Oven to Provide Heat Due to Not Having Enough Money for the Energy Bill During Past Year	**Almost Every Month**	1.4%	0.4%	0.6%	0.8%	0.1%	1.1%
	Some Months	3.7%	4.3%	6.0%	4.7%	4.2%	7.1%
	1 or 2 Months	3.9%	3.8%	5.3%	5.5%	2.5%	4.2%
	Never / No	91.0%	91.5%	88.0%	89.0%	93.2%	87.5%
Left Home for Part of the Day Because it was Too Hot or Too Cold Due to Not Having Enough Money for the Energy Bill During Past Year	**Almost Every Month**	0.5%	1.1%	1.3%	0.7%	1.2%	1.9%
	Some Months	3.0%	2.9%	5.9%	4.2%	0.9%	9.9%
	1 or 2 Months	5.6%	2.7%	3.4%	4.2%	2.4%	3.5%
	Never / No	91.0%	93.4%	89.4%	91.0%	95.5%	84.6%

Source: 2005 RECS

Table III-15b
Health and Safety Dimensions of Energy Insecurity in the Past 12 Months
By Vulnerability Group and Income Type, 2005
Households with Income at or Below the HHS Poverty Guidelines

Dimension	Frequency	Vulnerability Group			Income Type		
		Young Child	Elderly	Other	Employed	Retired	Cash Assistance and Other
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	1.6%	5.6%	1.4%	2.1%	5.3%	1.7%
	Some Months	4.4%	5.2%	6.2%	5.3%	4.3%	7.1%
	1 or 2 Months	3.2%	3.8%	4.0%	4.0%	3.7%	3.4%
	Never / No	90.1%	85.5%	88.4%	88.6%	86.8%	87.8%
Used Kitchen Stove or Oven to Provide Heat Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	2.7%	0.2%	0.5%	0.8%	0.3%	1.8%
	Some Months	4.4%	8.0%	8.3%	7.3%	6.3%	8.6%
	1 or 2 Months	4.9%	5.3%	6.1%	7.7%	2.3%	4.4%
	Never / No	88.0%	86.5%	85.0%	84.2%	91.1%	85.3%
Left Home for Part of the Day Because it was Too Hot or Too Cold Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	1.0%	1.8%	0.8%	1.0%	2.4%	0.3%
	Some Months	2.9%	3.5%	8.4%	3.7%	2.1%	13.2%
	1 or 2 Months	6.0%	4.8%	3.2%	4.6%	4.1%	4.5%
	Never / No	90.1%	89.9%	87.7%	90.8%	91.5%	82.1%

Source: 2005 RECS

E. Energy Insecurity by Energy Burden

Tables III-16 to III-20 show how energy burden relates to Energy Insecurity for LIHEAP income eligible households. These tables furnish information on residential energy burden (i.e., the percent of income spent on heating, cooling, water heating, and appliances) and home energy burden (i.e., the percent of household income spent on heating and cooling). This study estimates that, in 2005, there were 14.0 million LIHEAP income eligible households with high residential energy burden, 12.5 million with moderate burden, and 12.1 million with low burden.[16] The study estimates that, in 2005, there were 15.6 million LIHEAP income eligible households with high home energy burden, 9.3 million with moderate burden, and 13.7 million with low burden.[17] It is important to note that the RECS

[16] This study defines high energy burden as the "energy share" of severe housing burden. This study defines residential energy burden of 10.9 percent of income as a high burden, moderate energy burden as costs at or above 6.5 percent of income but less than 10.9 percent of income, and low energy burden as costs less than 6.5 percent of income.

[17] Heating and cooling expenditures comprise 39.3 percent of total residential energy expenditures. Therefore, high home energy burden is defined as heating and cooling costs that exceed 4.3 percent of income. Moderate home

uses regression analyses to provide estimates of the amounts of residential energy expenditures going to various end uses, including home heating and cooling. Actual heating and cooling expenditures may differ than those estimated by the RECS.

Table III-16 shows that in 2005, households with high residential energy burden were much more likely to have a heat interruption than households with moderate or low burdens. However, it appears that there is very little relationship between home energy burden and heat interruptions. One reason that high residential energy burden is better associated with heat interruptions compared to home energy burden may be the fact that if the household cannot pay its whole energy bill, it will be without heat regardless of what portion of the energy bill was for space heating.

Table III-16
Heat Interruption: Inability to Use the Main Source of Heat in the Past 12 Months
By Energy Burden, 2005

Reason for Heat Interruption	Residential Energy Burden			Home Energy Burden		
	High	Moderate	Low	High	Moderate	Low
Unable to pay for the repair of broken heating system	5.4%	3.8%	4.1%	3.9%	4.0%	5.4%
Unable to pay for bulk fuel delivery	4.6%	6.4%	5.6%	1.9%	8.5%	12.7%
Unable to pay for electric service	6.9%	3.3%	3.7%	4.8%	4.2%	4.9%
Unable to pay for gas service	6.4%	3.2%	2.0%	6.3%	2.3%	1.8%
Heat Interruption due to any of the four reasons	12.7%	7.4%	7.2%	9.8%	8.8%	9.0%

Source: 2005 RECS

Table III-17 focuses on the type of service interruptions. It shows that when all types of service interruptions are considered, households with high residential burden are still more likely to have heat interruptions. However, home energy burden is not correlated with service interruptions, in part because high home energy burden households report the lowest rate of cooling interruptions.

energy burden is defined as heating and cooling costs above 2.6 percent of income but less than 4.3 percent of income.

Table III-17
Type of Service Interruption in the Past 12 Months
By Energy Burden, 2005

Type of Interruption	Residential Energy Burden			Home Energy Burden		
	High	Moderate	Low	High	Moderate	Low
Heating Interruption	12.7%	7.4%	7.2%	9.8%	8.8%	9.0%
Cooling Interruption	9.7%	8.7%	7.4%	7.7%	9.8%	9.0%
Any Heating/Cooling Interruption	14.2%	10.7%	9.5%	11.0%	12.1%	11.9%

Source: 2005 RECS

Table III-18 focuses on the category of service interruptions. The households with high residential energy burden have a higher rate of payment-related service interruptions. Equipment/system interruptions do not appear to be related to energy burden.

Table III-18
Category of Service Interruption in the Past 12 Months
By Energy Burden, 2005

Category of Interruption	Residential Energy Burden			Home Energy Burden		
	High	Moderate	Low	High	Moderate	Low
Payment Only	6.2%	4.3%	3.6%	5.2%	5.1%	4.1%
Equipment/System Only	5.1%	5.4%	4.5%	4.0%	5.9%	5.5%
Both	2.9%	1.1%	1.3%	1.7%	1.2%	2.4%

Source: 2005 RECS

Table III-19 furnishes information on the financial dimensions of Energy Insecurity introduced in Section II of the report. Table III-19 focuses on the constraints households face on household necessities or whether they received shutoff notices or threats. The table shows that both types of financial Energy Insecurity appear to be related to residential energy burden, but - not related to the level of home energy burden.[18]

[18] The results were similar when net energy burden was used instead of the gross energy burden. For the LIHEAP recipient households, the household's net energy burden is defined as the share of annual household income that is used to pay annual energy bills net of the household's LIHEAP grant.

Table III-19
Financial Dimensions of Energy Insecurity in the Past 12 Months
By Energy Burden, 2005

Dimension	Frequency	Residential Energy Burden			Home Energy Burden		
		High	Moderate	Low	High	Moderate	Low
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	**Almost Every Month**	20.7%	18.4%	11.5%	19.5%	14.7%	15.9%
	Some Months	25.2%	22.1%	22.3%	22.0%	26.9%	22.2%
	1 or 2 Months	5.2%	8.5%	6.7%	5.9%	8.1%	6.7%
	Never / No	48.9%	51.0%	59.6%	52.7%	50.3%	55.2%
Received Notice or Threat to Disconnect or Discontinue Electricity or Home Heating Fuel Due to Not Having Enough Money for the Energy Bill During the Past Year	**Almost Every Month**	4.0%	2.8%	1.0%	3.7%	2.7%	1.6%
	Some Months	11.2%	8.3%	6.1%	9.7%	8.8%	7.4%
	1 or 2 Months	10.0%	9.7%	8.7%	8.8%	8.0%	11.4%
	Never / No	74.8%	79.2%	84.1%	77.9%	80.6%	79.7%

Source: 2005 RECS

Table III-20 furnishes information on the health and safety dimensions of Energy Insecurity by Census Region. This analysis presents information on three important aspects of health and safety Energy Insecurity – keeping the home at an unsafe temperature, leaving the home for part of the day, and using the kitchen stove or oven for heat. This table shows that households with the highest residential energy burden are the most likely to keep their homes at a temperature that they felt was unsafe. However, for most other indicators, neither residential energy burden nor home energy burden appears to be related to higher levels of Energy Insecurity.

Table III-20
Health and Safety Dimensions of Energy Insecurity in the Past 12 Months
By Energy Burden, 2005

Dimension	Frequency	Residential Energy Burden			Home Energy Burden		
		High	Moderate	Low	High	Moderate	Low
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	2.3%	1.5%	1.5%	1.5%	1.3%	2.4%
	Some Months	5.4%	4.5%	2.2%	4.7%	3.9%	3.6%
	1 or 2 Months	3.0%	3.0%	1.5%	3.0%	2.4%	2.0%
	Never / No	89.3%	91.1%	94.8%	90.8%	92.2%	92.1%
Used Kitchen Stove or Oven to Provide Heat Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	0.8%	0.7%	0.6%	0.6%	0.4%	1.0%
	Some Months	7.1%	4.7%	2.7%	6.6%	3.5%	4.0%
	1 or 2 Months	4.7%	4.4%	4.3%	5.0%	3.3%	4.7%
	Never / No	87.4%	90.3%	92.4%	87.8%	92.7%	90.3%
Left Home for Part of the Day Because it was Too Hot or Too Cold Due to Not Having Enough Money for the Energy Bill During Past Year	Almost Every Month	0.6%	1.1%	1.5%	0.6%	0.7%	1.8%
	Some Months	4.1%	4.5%	4.0%	2.9%	4.2%	5.6%
	1 or 2 Months	4.1%	2.4%	4.2%	3.3%	2.7%	4.5%
	Never / No	91.2%	92.0%	90.2 %	93.2%	92.4%	88.1%

Source: 2005 RECS

F. Energy Insecurity by LIHEAP Recipiency

Tables III-21 to III-25 show how LIHEAP recipiency relates to Energy Insecurity for LIHEAP income eligible households. As part of the 2005 RECS processing, the addresses of survey respondents were compared to State LIHEAP administrative records to assess whether these households received LIHEAP benefits. Table III-21 shows that, in 2005, LIHEAP recipient households had higher rates of heat interruptions than nonrecipients; recipients had about 50 percent more interruptions than nonrecipients. At some level, this finding suggests that LIHEAP had been successful in targeting those households that have the greatest need for energy assistance since they have heating interruptions.

Table III-21
Heat Interruption: Inability to Use the Main Source of Heat in the Past 12 Months
By LIHEAP Recipiency, 2005

Reason for Heat Interruption	LIHEAP Recipients	LIHEAP Nonrecipients
Unable to pay for the repair of broken heating system	6.8%	4.3%
Unable to pay for bulk fuel delivery	13.5%	4.7%
Unable to pay for electric service	6.1%	4.6%
Unable to pay for gas service	7.9%	3.4%
Heat Interruption due to any of the four reasons	13.6%	8.9%

Source: 2005 RECS

Table III-22 focuses on the type of service interruptions. It shows that when all types of service interruptions are considered, LIHEAP recipient households are still more likely to have heat interruptions; LIHEAP recipients have about 50 percent more heating interruptions and about 25 percent more cooling interruptions.

Table III-22
Type of Service Interruption in the Past 12 Months
By LIHEAP Recipiency, 2005

Type of Interruption	LIHEAP Recipients	LIHEAP Nonrecipients
Heating Interruption	13.6%	8.9%
Cooling Interruption	10.8%	8.5%
Any Heating/Cooling Interruption	15.7%	11.3%

Source: 2005 RECS

Table III-23 focuses on the category of service interruptions. LIHEAP recipient households have about 50 percent more payment interruptions than nonrecipients and about 25 percent more equipment interruptions. LIHEAP recipients are also much more likely to have both types of service interruptions.

Table III-23
Category of Service Interruption in the Past 12 Months
By LHEAP Recipiency, 2005

Category of Interruption	LIHEAP Recipients	LIHEAP Nonrecipients
Payment Only	6.8%	4.6%
Equipment/System Only	6.1%	4.9%
Both	2.8%	1.7%

Source: 2005 RECS

Table III-24 furnishes information on the financial dimensions of Energy Insecurity introduced in Section II of the report. Table III-24 focuses on the constraints households face on household necessities or whether they received shutoff notices or threats. The table shows that LIHEAP recipients are much more likely to have both types of Energy Insecurity than nonrecipients. About 65 percent of LIHEAP recipients had to reduce expenditures for basic necessities compared to about 45 percent of nonrecipients. Similarly, almost 40 percent of LIHEAP recipients had received service termination threats, compared to about 20 percent of nonrecipients. These statistics furnish additional evidence that LIHEAP is targeting the low income households with the highest level of need for energy assistance.

Table III-24
Financial Dimensions of Energy Insecurity in the Past 12 Months
By LIHEAP Recipiency, 2005

Dimension	Frequency	LIHEAP Recipients	LIHEAP Nonrecipients
Reduced Expenses for Household Necessities Due to Not Having Enough Money for the Energy Bill During the Past Year	**Almost Every Month**	25.9%	16.5%
	Some Months	33.5%	22.4%
	1 or 2 Months	6.1%	6.8%
	Never / No	34.5%	54.3%
Received Notice or Threat to Disconnect or Discontinue Electricity or Home Heating Fuel Due to Not Having Enough Money for the Energy Bill During the Past Year	**Almost Every Month**	7.1%	2.4%
	Some Months	16.8%	8.0%
	1 or 2 Months	14.5%	9.1%
	Never / No	61.6 %	80.4%

Source: 2005 RECS

Table III-25 furnishes information on the health and safety dimensions of Energy Insecurity by LIHEAP Recipiency. This analysis presents information on three important aspects of health and safety Energy Insecurity – keeping the home at an unsafe temperature, leaving the home for part of the day, and using the kitchen stove or oven for heat. This table shows that LIHEAP recipient households are more likely than nonrecipients to experience all types of health and safety Energy Insecurity than nonrecipient households.

Table III-25
Health and Safety Dimensions of Energy Insecurity in the Past 12 Months
By LIHEAP Recipiency, 2005

Dimension	Frequency	LIHEAP Recipients	LIHEAP Nonrecipients
Kept Home at Temperature You Felt Was Unsafe or Unhealthy Due to Not Having Enough Money for the Energy Bill During Past Year	**Almost Every Month**	3.3%	1.7%
	Some Months	6.1%	3.9%
	1 or 2 Months	2.3%	2.5%
	Never / No	88.3%	91.9%
Used Kitchen Stove or Oven to Provide Heat Due to Not Having Enough Money for the Energy Bill During Past Year	**Almost Every Month**	0.9%	0.7%
	Some Months	12.6%	4.4%
	1 or 2 Months	5.8%	4.4%
	Never / No	80.7%	90.6%
Left Home for Part of the Day Because it was Too Hot or Too Cold Due to Not Having Enough Money for the Energy Bill During Past Year	**Almost Every Month**	1.1%	1.0%
	Some Months	7.6%	3.9%
	1 or 2 Months	4.5%	3.5%
	Never / No	86.8 %	91.5%

Source: 2005 RECS

G. Multivariate Analysis

Data tabulations in this section showed how Energy Insecurity was distributed geographically and demographically for the low income households. They furnished detailed information on how Energy Insecurity levels vary for key population subgroups. This part assesses the relationship between the different dimensions of Energy Insecurity and the geographic, demographic, and income/energy burden factors based on multivariate analyses of the data. A multivariate analysis allows one to see how all these factors simultaneously affect the Energy Insecurity of low income households.

This study used multiple regression analysis[19] to examine the effects of these factors on Energy Insecurity of LIHEAP income eligible households. Multiple regression analysis allows one to discriminate between the effects of the explanatory variables, making allowance for the fact that they may be correlated. The regression coefficient of each explanatory variable provides an estimate of its influence on Energy Insecurity, controlling for the effects of all the other explanatory variables included in the model.

The explanatory variables included in the regression model were Census Region indicators, poverty level, residential (or home) energy burden, presence of an elderly or young child

[19] In multiple regression analysis, a single **dependent** variable, **Y**, is considered to be a function of one or more explanatory variables, $\mathbf{X}_1$, $\mathbf{X}_2$, and so on.

member in the household, and whether the household uses bulk fuel. Although the overall model was statistically significant, the amount of variation in various forms of Energy Insecurity that can be explained by the regression model was low. That means that there is a significant amount of variation in Energy Insecurity that cannot be explained by the explanatory variables included in the model.

Key findings from the data tabulations in this section were:

- Geography – Low income households in the South and West Census Regions were more likely to experience service interruptions. Households in the Northeast were less likely to have financial or health and safety Energy Insecurity.

- Income – Lower household income was associated with a higher level of Energy Insecurity.

- Vulnerability – Elderly low income households experienced lower levels of service interruptions and financial Energy Insecurity compared to other groups of vulnerable households. However, all vulnerable households experienced health and safety Energy Insecurity at about the same rate.

- Energy Burden – Households with high residential energy burden experienced higher levels of Energy Insecurity. The association between the level of home energy burden and level of Energy Insecurity was weak.

- LIHEAP Recipiency – LIHEAP recipient households had higher rates of service interruptions and both financial and health and safety Energy Insecurity compared to nonrecipient low income households.

The multivariate analysis of data confirmed the following findings from the tabular analysis:

- Low income households in the South and West were likely to experience higher rates of service interruptions and households in the Northeast were likely to have lower levels of health and safety Energy Insecurity when poverty level, residential energy burden, presence of an elderly or young child member in the household, and whether the household uses bulk fuel were controlled for.

- Lower household income was associated with a greater incidence of Energy Insecurity of any type when other factors were controlled for.

- High residential energy burden was associated with a greater incidence of Energy Insecurity of any type when other factors were controlled for.

- Elderly low income households experienced lower levels of service interruptions and financial Energy Insecurity when other factors were controlled for.

The multivariate analysis of data showed the following differences:

- Low income households in different Census regions were likely to experience similar rates of financial Energy Insecurity when other factors were controlled for.

- Elderly low income households experienced lower levels of health and safety Energy Insecurity when other factors were controlled for.

Key new findings from the multivariate analysis include:

- Both the level of residential energy burden and household poverty level are strong factors related to Energy Insecurity. However, high residential energy burden is a better predictor of Energy Insecurity than household poverty level.

- High home energy burden is also associated with higher levels of Energy Insecurity. However, once household poverty level is controlled for, this association no longer exists. This suggests that household poverty level is a better predictor of household Energy Insecurity than home energy burden.

Most findings from the multivariate analyses were consistent with the findings from the tabular analyses of the data. Therefore, the reader can rely on the results from the tabular analyses. Multivariate analysis indicated that high residential energy burden is the strongest factor related to Energy Insecurity of low income households compared to other factors included in the analysis.

IV. Performance of the Home Energy Insecurity Scale

This section of the report examines the Home Energy Insecurity Scale developed by Colton for OCS in 2003. The scale was developed as a way to describe the overall status of households with respect to Energy Insecurity. In this section, data from the 2005 RECS are used to compute the Home Energy Insecurity Scale classifications of all LIHEAP income eligible households. In addition, an alternative way to define the scale is proposed.

A. The 2005 RECS Home Energy Insecurity Scale

Colton originally developed the Home Energy Insecurity Scale in 2003 for OCS as a tool to describe the home energy status of LIHEAP income-eligible households. [20] The Scale combines information obtained from various Energy Insecurity questions into a single measure that can characterize the energy needs of low income households. Based on responses to these questions, households are placed in one of the five thresholds:

- "A ***thriving*** household is one that has achieved generally accepted standards of well-being. A thriving household can engage in the full range of home energy uses of its choice without outside assistance and without financial strain.

- A ***capable*** household is secure, even though not having achieved the full range of generally accepted standards of well-being.

- A ***stable*** household does not face significant threats and is unlikely to be in immediate crisis. A stable household may on infrequent occasion need to engage in temporary or inappropriate actions because it lacks money to pay its home energy bills, but it does not do so regularly.

- A ***vulnerable*** household is one that is not in immediate danger, but that may avoid this danger only through temporary or inappropriate solutions. A vulnerable household may occasionally face energy choices that require it to compromise not merely on comfort and/or convenience, but on basic household energy needs such as heating and/or hot water.

- An ***in-crisis*** household faces immediate needs that threaten the household's physical and/or emotional safety. Three alternative conditions exist of which anyone might place someone in the "in-crisis" threshold: (1) the household goes without energy; or (2) the household has energy, but has to routinely compromise on its energy use for basic

[20] Colton, R. (2003). "Measuring the Outcomes of Low-Income Energy Assistance Programs through a Home Energy Insecurity Scale." A Publication Prepared for: LIHEAP Committee on Managing for Results. U.S. Department of Health and Human Services. Administration for Children and Families. Office of Community Services, Division of Energy Assistance.

household necessities; or (3) the household does not compromise on its energy use, but in order to maintain that energy use, must compromise on non-energy basic necessities."

The Home Energy Insecurity Scale was initially developed as a tool for caseworkers to measure the impact of energy assistance programs on the home Energy Insecurity of low income households. APPRISE subsequently collaborated with Colton and developed a modified set of questions. The modified instrument can be used by interviewers, and allows a systematic and automated assessment of Energy Insecurity based on survey responses. The 2005 RECS questionnaire used this modified set of questions. The response patterns used to classify households on the 2005 RECS Home Energy Insecurity Scale are given in Table IV-1.

Table IV-1
The 2005 RECS Home Energy Insecurity Scale

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

Table IV-2 shows the Scale classification of LIHEAP income eligible households by region. Nationally, approximately 25 percent (9.2 million) of households are classified as in-crises, 28 percent (10.1 million) as vulnerable, and about 40 percent (14.3 million) as thriving. Households in the South and West are most likely to be in-crisis. Households in the West are least likely to be thriving. A very small proportion of households are classified as either capable or stable in each census region.

Table IV-2
The 2005 RECS Home Energy Insecurity Scale
By Census Region, 2005

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

Source: 2005 RECS

Table IV-3 shows the Scale classification of LIHEAP income eligible households by poverty level and income group. More than 60 percent of households with incomes below poverty (9.6 million) are either vulnerable or in-crisis. The likelihood of being in crisis or vulnerable decreases as poverty level increases. Higher annual income is associated with a lower probability of being in-crisis.

Table IV-3
The 2005 RECS Home Energy Insecurity Scale
By Poverty Level and Income, 2005

Threshold	Poverty Level			Annual Income		
	<=100%	101%-150%	>150%	<$10K	$10K-<$20K	>=$20K
Thriving	32.7%	42.9%	48.2%	37.6%	43.2%	36.7%
Capable	3.1%	3.4%	3.2%	2.4%	3.6%	3.4%
Stable	3.2%	4.1%	3.9%	2.6%	4.0%	4.0%
Vulnerable	27.5%	28.9%	27.5%	23.8%	25.9%	33.9%
In-Crisis	33.6%	20.8%	17.3%	33.7%	23.3%	22.0%
TOTAL	100%	100%	100%	100%	100%	100%

Source: 2005 RECS

Table IV-4 shows the Scale classification of LIHEAP income eligible households by vulnerability group and income type. About 65 percent of young child households (4.8 million) are either vulnerable or in-crisis compared to about 40 percent of elderly households (5.5 million). The likelihood of being in crisis or vulnerable is higher for the households that are on cash assistance or have other types of incomes compared to households with employment or retirement income.

Table IV-4
The 2005 RECS Home Energy Insecurity Scale
By Vulnerability Group and Income Type, 2005

Threshold	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Thriving	27.7%	53.0%	34.0%	35.4%	53.0%	32.5%
Capable	4.1%	2.6%	3.3%	3.5%	3.4%	1.8%
Stable	4.2%	2.8%	4.1%	4.5%	1.9%	3.3%
Vulnerable	37.0%	22.8%	28.1%	30.7%	23.9%	24.7%
In-Crisis	27.1%	18.8%	30.6%	25.9%	17.8%	37.8%
TOTAL	100%	100%	100%	100%	100%	100%

Source: 2005 RECS

Table IV-3 illustrated that households below poverty are much more likely to be in-crisis or vulnerable. Table IV-5 shows the Scale classification of households below poverty by vulnerability group and income type. About 68 percent of young child households are either vulnerable or in-crisis compared to about 53 percent of elderly households. The percentage of elderly households that are in-crisis or vulnerable is significantly higher for households below poverty than that for above poverty. The difference in the Scale ratings across households of different vulnerability groups or income types is smaller for households below poverty than those above poverty.

Table IV-5
The 2005 RECS Home Energy Insecurity Scale
By Vulnerability Group and Income Type for Households below Poverty, 2005

Threshold	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Thriving	24.1%	42.7%	29.1%	29.8%	41.2%	29.2%
Capable	2.7%	3.4%	3.0%	3.5%	3.2%	2.0%
Stable	5.4%	1.1%	3.7%	4.8%	0.3%	3.0%
Vulnerable	37.6%	25.3%	23.7%	30.3%	26.3%	22.4%
In-Crisis	30.2%	27.5%	40.5%	31.8%	29.0%	43.5%
TOTAL	100%	100%	100%	100%	100%	100%

Source: 2005 RECS

Table IV-6 shows the Scale classification of LIHEAP income eligible households by residential and home energy burden. Higher residential energy burden is associated with a worse Scale threshold classification. The association of home energy burden and the Scale rating is weaker than that for residential energy burden and the Scale.

Table IV-6
The 2005 RECS Home Energy Insecurity Scale
By Energy Burden, 2005

Threshold	Residential Energy Burden			Home Energy Burden		
	High	Moderate	Low	High	Moderate	Low
Thriving	35.5%	38.3%	45.7%	38.8%	39.5%	40.7%
Capable	2.8%	3.1%	3.8%	3.8%	2.6%	3.0%
Stable	3.5%	3.5%	3.8%	3.4%	4.3%	3.4%
Vulnerable	27.3%	30.2%	26.5%	25.9%	32.9%	27.0%
In-Crisis	31.0%	24.8%	20.2%	28.1%	20.7%	26.0%
TOTAL	100%	100%	100%	100%	100%	100%

Source: 2005 RECS

Table IV-7 shows the Scale classification of LIHEAP income eligible households by LIHEAP status. Nearly 75 percent of LIHEAP recipient households are either vulnerable or in-crisis compared to about 52 percent of LIHEAP nonrecipients. A very small percentage of LIHEAP recipient or nonrecipient households are classified as either capable or stable.

Table IV-7
The 2005 RECS Home Energy Insecurity Scale
By LIHEAP Status, 2005

Threshold	LIHEAP Recipients	LIHEAP Nonrecipients
Thriving	17.7%	41.2%
Capable	4.8%	3.2%
Stable	3.8%	3.6%
Vulnerable	34.2%	27.5%
In-Crisis	39.6%	24.6%
TOTAL	100%	100%

Source: 2005 RECS

B. The Alternative Home Energy Insecurity Scale

The Home Energy Insecurity Scale is a convenient way of combining information from the Energy Insecurity questions into one measure that characterizes the needs of the low income population. After reviewing the categorization methodology on the Scale, an alternative assignment procedure was tested to assess whether minor revisions to the categorization procedures would change the distribution of households.

One problem associated with the version of the 2005 RECS Home Energy Insecurity Scale is that it places a very small percentage of households that are not thriving into capable and stable categories and pushes the rest into vulnerable or in-crisis categories. This makes it hard to characterize the needs of low income households.

This study investigated the underlying factors that place households in vulnerable and in-crisis status on the Scale and revised the classification of households based on the responses to the following questions:

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

According to the new classification, a household can be capable it closes off part of home for some months and stable if it does it for almost every month. The question about financial strain is used only to separate thriving households from the rest. A household can still be stable if it receives shutoff notice or threat for 1 or 2 months but does not actually experiences a shutoff. The question about the reduction in expenditures on household necessities does not clearly specify what these necessities are. About half of the RECS respondents said that they reduced their expenditures on household necessities in order to pay for their energy bills. The Scale places all of these households into either vulnerable or in-crisis categories. This study proposes a different classification based on this question that moves some households into stable and capable thresholds.

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

The response patterns used to classify households on the Alternative Home Energy Insecurity Scale are given in Table IV-7. The changes from the 2005 RECS Home Energy Insecurity Scale are highlighted in the table.

Table IV-7
The Alternative Home Energy Insecurity Scale

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

Table IV-8 shows the classification of low income households on the 2005 RECS Home Energy Insecurity Scale and the Alternative Home Energy Insecurity Scale. The Alternative Scale classifies a significantly larger percentage of households as "capable" or "stable" compared to the 2005 RECS Scale.

Table IV-8
The Home Energy Insecurity Scale

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

Source: 2005 RECS

Table IV-9 shows the Energy Insecurity of LIHEAP income eligible households according to the Alternative Scale classification by region. Nationally, this time approximately 14 percent (5.0 million) of households are classified as in-crisis, 13 percent (4.5 million) as vulnerable, and nearly 39 percent (13.8 million) as thriving. Households in the South and West are most likely to be in-crisis. Households in the Northeast are least likely to be in-crisis or vulnerable.

Table IV-9
The Alternative Home Energy Insecurity Scale
By Census Region, 2005

Threshold	Census Region				U.S.
	Northeast	Midwest	South	West	
Thriving	44.0%	36.7%	39.1%	33.7%	38.5%
Capable	21.6%	20.2%	15.6%	16.9%	18.2%
Stable	15.7%	19.4%	16.5%	16.4%	17.0%
Vulnerable	9.3%	13.2%	10.4%	18.7%	12.5%
In-Crisis	9.5%	10.5%	18.4%	14.3%	13.9%
TOTAL	100%	100%	100%	100%	100%

Source: 2005 RECS

Table IV-10 shows the Energy Insecurity of LIHEAP income eligible households according to the Alternative Scale classification by poverty level and income group. Nearly 35 percent of households with incomes below poverty are either vulnerable or in-crisis. The likelihood of being in crisis or vulnerable decreases as poverty level or household income increases.

Table IV-10
The Alternative Home Energy Insecurity Scale
By Poverty Level and Income, 2005

Threshold	Poverty Level			Annual Income		
	<=100%	101%-150%	>150%	<$10K	$10K-<$20K	>=$20K
Thriving	31.0%	41.9%	47.6%	35.9%	41.9%	36.2%
Capable	17.7%	19.1%	17.9%	15.3%	16.3%	22.9%
Stable	17.1%	17.9%	15.4%	14.9%	16.7%	19.1%
Vulnerable	15.3%	10.5%	10.0%	15.4%	12.4%	10.3%
In-Crisis	18.9%	10.7%	9.1%	18.5%	12.8%	11.5%
TOTAL	100%	100%	100%	100%	100%	100%

Source: 2005 RECS

Table IV-11 shows the Energy Insecurity of LIHEAP income eligible households according to the Alternative Scale classification by vulnerability group and income type. More than 25 percent of young child households are either vulnerable or in-crisis compared to about 18 percent of elderly households. The likelihood of being in crisis or vulnerable is higher for households that are on cash assistance or have other types of incomes compared to households with employment or retirement income.

Table IV-11
The Alternative Home Energy Insecurity Scale
By Vulnerability Group and Income Type, 2005

Threshold	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Thriving	26.7%	51.4%	33.0%	34.7%	51.4%	30.3%
Capable	21.3%	17.9%	17.0%	18.5%	19.4%	15.1%
Stable	26.4%	13.0%	16.1%	18.3%	15.1%	15.5%
Vulnerable	11.0%	8.9%	16.3%	13.9%	5.6%	19.1%
In-Crisis	14.9%	8.9%	17.6%	14.7%	8.5%	20.0%
TOTAL	100%	100%	100%	100%	100%	100%

Source: 2005 RECS

Table IV-10 illustrated that households below poverty are much more likely to be in-crisis or vulnerable. Table IV-12 shows the Scale classification of households below poverty by vulnerability group and income type. Twenty-nine percent of young child households are either vulnerable or in-crisis compared to 26 percent of elderly households. The percentage of elderly households that are in-crisis or vulnerable is significantly higher for households below poverty than that for above poverty.

The difference in the Scale ratings across households of different vulnerability groups or income types is smaller for households below poverty than those above poverty.

Table IV-12
The Alternative Home Energy Insecurity Scale
By Vulnerability Group and Income Type for Households below Poverty, 2005

Threshold	Vulnerability Group			Income Type		
	Young Child	Elderly	Other	Employed	Retired	Cash Assistance or Other
Thriving	23.1%	40.3%	27.8%	28.9%	42.38.9%	26.6%
Capable	23.1%	19.6%	13.1%	18.6%	20.5%	12.1%
Stable	24.8%	14.0%	15.4%	15.3%	19.6%	18.4%
Vulnerable	12.8%	12.1%	19.3%	17.0%	6.8%	21.7%
In-Crisis	16.2%	14.0%	24.3%	20.2%	14.2%	21.2%
TOTAL	100%	100%	100%	100%	100%	100%

Source: 2005 RECS

Table IV-13 shows the Energy Insecurity of LIHEAP income eligible households according to the Alternative Scale classification by residential and home energy burden. Higher residential energy burden is associated with a worse Scale threshold classification. The association of home energy burden and the Scale rating is weaker than that for residential energy burden and the Scale.

Table IV-13
The Alternative Home Energy Insecurity Scale
By Energy Burden, 2005

Threshold	Residential Energy Burden			Home Energy Burden		
	High	Moderate	Low	High	Moderate	Low
Thriving	34.3%	37.0%	44.7%	37.6%	38.1%	39.7%
Capable	18.9%	17.2%	18.4%	18.8%	21.0%	15.6%
Stable	15.7%	18.9%	16.6%	15.9%	17.1%	18.2%
Vulnerable	13.0%	14.6%	9.7%	12.3%	12.6%	12.7%
In-Crisis	18.3%	12.2%	10.6%	15.4%	11.2%	14.0%
TOTAL	100%	100%	100%	100%	100%	100%

Source: 2005 RECS

Table IV-14 shows the Energy Insecurity of low income households according to the Alternative Scale classification by LIHEAP status. About 45 percent of LIHEAP recipient households are

either vulnerable or in-crisis compared to about 25 percent of LIHEAP nonrecipients. The percentage of LIHEAP recipients that are classified as either capable or stable is similar to that for nonrecipients. 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 highest home energy needs. This finding shows that LIHEAP is targeting households with greater energy needs.

Table IV-14
The Alternative Home Energy Insecurity Scale
By LIHEAP Status, 2005

Threshold	LIHEAP Recipients	LIHEAP Nonrecipients
Thriving	0.0%	41.2%
Capable	34.7%	17.1%
Stable	21.2%	16.7%
Vulnerable	19.3%	11.9%
In-Crisis	24.8%	13.2%
TOTAL	100%	100%

Source: 2005 RECS

V. Study Implications

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

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

- Factors Related to Energy Insecurity – The study included an analysis of the factors associated with energy problems including income, energy burden, geographic region and other demographic and housing factors.

- Performance of the Home Energy Insecurity Scale – The study assessed the performance of the Home Energy Insecurity Scale for measuring the impacts of energy costs on low income households compared to other Energy Insecurity measures used in the past.

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

A. Levels and Types of Energy Insecurity

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

- *Heating and Cooling Service Interruptions* - Tracking the levels and types of home heating and cooling service interruptions continues to be an important purpose of the RECS survey. The 2005 RECS showed during 2005 that 9.1 percent of low income households had heating interruptions during the heating season and 7.0 percent had air conditioning interruptions during the cooling season. The space heating interruption rate was the highest measured since the question was added to the RECS in 1984 (note: The air conditioning interruption questions were new for 2005).

- *LIHEAP's Role in Restoring Service* – Adding questions on whether LIHEAP was successful in helping to restore heating and air conditioning service to RECS provides the ability to document one important performance indicator for LIHEAP. The statistics from the 2005 RECS show that LIHEAP helped to restore home

heating for 59 percent of LIHEAP recipient households with heating interruptions and 17 percent of all low income households with heating interruptions.[21] The 2005 RECS also showed that LIHEAP helped to restore air conditioning for 40 percent of LIHEAP recipient households with air conditioning interruptions and 8 percent of all low income households with air conditioning interruptions. LIHEAP was able to restore service for a relatively lower percentage of households having air conditioning interruptions compared to households having heat interruptions because there are relatively fewer States that provide home cooling/air conditioning equipment repair assistance.

- *Financial Energy Insecurity* – The inclusion of questions that document financial Energy Insecurity for low income households provides a much better understanding of the extent to which energy costs affect low income households; the statistics show that almost 60 percent of low income households face financial Energy Insecurity and that about one-fourth of those households face financial Energy Insecurity "almost every month." Moreover, the analysis also found that financial Energy Insecurity is an indicator of an increased risk for heating and air conditioning service interruptions.

- *Health and Safety Energy Insecurity* – The inclusion of questions that document health and safety Energy Insecurity for low income households gives additional information on the other ways that energy affordability problems can affect low income households. For example, it showed that, in 2005, almost 10 percent of low income households kept their home at a temperature that they thought was unsafe to deal with energy affordability problems. Overall, about one-fourth of low income households experienced health and safety Energy Insecurity. Moreover, about 90 percent of the households that reported health and safety Energy Insecurity did not report heating or air conditioning interruptions, indicating that the questions from previous RECS surveys on interruptions were not capturing the entire set of risks faced by low income households because of energy affordability problems.

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

B. Factors Related to Energy Insecurity

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

[21] Helpfulness of LIHEAP in restoring service is self-reported. Because service shutoff is a major problem for the household, the respondent would remember it and report correctly. However, service restoration cannot be attributed to LIHEAP with certainty, as the respondent may confuse LIHEAP with other fuel assistance programs in the State.

- *Poverty Level* – It is clear from the analysis that poverty level, rather than income level, is associated with all types of Energy Insecurity. This shows that household size plays an important role. When developing benefit assignment procedures, States might be able to increase the effectiveness of LIHEAP if they group households by poverty level, rather than income level.

- *Energy Burden* – Residential energy burden is associated with Energy Insecurity while home energy burden is very weakly associated; States might be able to increase the effectiveness of their LIHEAP programs by using actual residential energy bills to help set benefit levels.

- *Vulnerable Groups* – It is important for States to consider all types of Energy Insecurity in setting benefits. While low income elderly households have lower rates of service interruptions and financial Energy Insecurity, they report similar rates of health and safety Energy Insecurity. Since it is harder to directly observe health and safety Energy Insecurity, local LIHEAP intake offices may need to conduct more extensive outreach to identify such households.

In general, the analysis shows it is appropriate to target LIHEAP to the households with the highest needs. However, the analysis also shows that subtle changes in targeting (i.e., focusing on residential energy burden rather than home energy burden) may be appropriate.

C. Home Energy Insecurity Scale

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

1. *LIHEAP Targeting* – The Home Energy Insecurity Scale makes it easier for LIHEAP program managers to see what groups of households are at greater risk for problems resulting from energy affordability. By targeting such households, program managers may be able to increase the effectiveness of LIHEAP.

2. *Performance Measurement* – It is clear that some low income households have a higher level of Energy Insecurity than others. It may be appropriate for LIHEAP to use the reduction in Energy Insecurity as a performance measure for LIHEAP.

3. *Study and Analysis* – However, there are some important questions about the Home Energy Insecurity Scale. In particular, it is important to measure how the different levels of Home Energy Insecurity relate to the long term health and well-being of low income households. For that reason, it would be appropriate for OCS to continue to study the Home Energy Insecurity Scale and its policy implications.

The 2005 RECS furnishes a rich database of information on the energy needs of low income households. By supplementing heat interruptions questions with questions on the broader

range of energy problems, the survey has given policymakers much better information on the impacts of energy affordability.

VI. Appendix

A. 2005 RECS Section K: Energy Assistance Questions

K-1 **As a result of energy price increases, some households have faced challenges in paying home energy bills. The next set of questions are about the challenges you may have faced. Please look at Card 29. In the past 12 months, did you *almost every* month, *some* months*, only 1 or 2 months*, or *never* do the following because there wasn't enough money for your home energy bill?**

			Almost Every Month	Some Months	Only 1 or 2 Months	Never
K-1a	SCALEA	**Did you worry that you wouldn't be able to pay your home energy bill?**	1	2	3	4
K-1b	SCALEB	**Did you reduce your expenses for what you consider to be basic household necessities?**	1	2	3	4
K-1c	SCALEC	**Did you need to borrow from a friend or relative to pay your home energy bill?**	1	2	3	4
K-1d	SCALED	**Did you skip paying your home energy bill or pay less than your whole home energy bill?**	1	2	3	4
K-1e	SCALEE	**Did you have a supplier of your electric or home heating service threaten to disconnect your electricity or home heating fuel service, or discontinue making fuel deliveries?**	1	2	3	4
K-1f	SCALEF	**Did you close off part of your home because you could not afford to heat or cool it?**	1	2	3	4
K-1g	SCALEG	**Did you keep your home at a temperature that you felt was unsafe or unhealthy at any time of the year?**	1	2	3	4
K-1h	SCALEH	**Did you leave your home for part of the day because it was too hot or too cold?**	1	2	3	4
K-1i	SCALEI	**Did you use your kitchen stove or oven to provide heat?**	1	2	3	4

K-2 ENERGYAID **There is a home energy assistance program that helps people pay for their heating, cooling and other home energy costs and/or repair or replacement of their heating/cooling equipment. During the past 12 months did anyone in your household receive energy assistance?**

Yes 1
No 0

K-2a [If ENERGYAID=Yes] AIDADDRESS **Did you receive energy assistance at this address?**

Yes 1
No 0

K-3 [If FUELHEAT<>99 and DNTHEAT<>2] **Was there ever a time during the past 12 months when you wanted to use your main source of heat, but could not, for one or more of the following reasons:**

		Yes	No
K-3a	NOPYFIX **Your heating system was *broken* and you were *unable* to pay for its repair or replacement?**	1	0
K-3a1	[If NOPYFIX=Yes and ENERGYAID=Yes] NOPYFIXREST **Did receiving energy assistance help you to restore heating of your home?**	1	0
K-3b	[If ELWARM<>Yes and UGWARM<>Yes] NOPYFL **You *ran out* of fuel oil, kerosene, propane (bottled gas), coal, or wood because you were *unable* to pay for a delivery?**	1	0
K-3b1	[If NOPYFL=Yes and ENERGYAID=Yes] NOPYFLREST **Did receiving energy assistance help you to restore heating of your home?**	1	0
K-3c	NOPYEL **The utility company *discontinued* your electric service because you were *unable* to pay your bill?**	1	0
K-3c1	[If NOPYEL=Yes and ENERGYAID=Yes] NOPYELREST **Did receiving energy assistance help you to restore heating of your home?**	1	0
K-3d	[If UGWARM=Yes] NOPYGA **The utility company *discontinued* your gas service because you were *unable* to pay your bill?**	1	0
K-3d1	[If NOPYGA=Yes and ENERGYAID=Yes] NOPYGAREST **Did receiving energy assistance help you to restore heating of your home?**	1	0

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

		Yes	No
K-4a	NOPYFIXAC **Your air-conditioner was *broken* and you were *unable* to pay for its repair or replacement?**	1	0
K-4a1	[If NOPYFIXAC=Yes and ENERGYAID=Yes] NOPYFIXACREST **Did receiving energy assistance help you to restore cooling of your home?**	1	0

K-4b NOPYELAC **The utility company *discontinued* your electric service because you were *unable* to pay your bill?** ..... 1.....0

K-4b1 [If NOPYELAC=Yes and ENERGYAID=Yes] NOPYELACREST **Did receiving energy assistance help you to restore cooling of your home?** ..... 1.....0

K-5 [If NOPYEL=Yes or NOPYELAC=Yes, GO TO QUESTION K-7] SOMEPY **In the past 12 months, has there been a time when your household did not pay the full amount due for an electric bill?**

Yes 1
No..... 0

K-6 NOPY **In the past 12 months was your electricity ever discontinued because you were unable to pay your electric bill?**

Yes 1
No..... 0

K-6a [If NOPY=Yes] MTHSNOPY **In which months was your electricity discontinued?** (Mark all that apply.)

January	1	July	7
February	2	August	8
March	3	September	9
April	4	October	10
May	5	November	11
June	6	December	12

K-6b [If NOPY=Yes] NTIMEWOEL **How many separate times were you without electricity because your electric service was discontinued?**

Enter the number of times..... ☐

K-6c [If NOPY=Yes] NDAYSWOEL **Altogether, how many days were you without electricity in the past 12 months because your electric service was discontinued?**

Enter the number of whole days ..... ☐