

# DETERMINANTS OF ENERGY SAVING PRACTICES OF LIMITED INCOME MULTIFAMILY HOUSING RESIDENTS

Hyun-Jeong Lee and JoAnn Emmel

---

## Abstract

*The purpose of this study was to identify energy cost burdens and energy saving practices of limited income Virginia households, focusing on multifamily housing residents. There were three research objectives: (a) to identify demographic and housing characteristics of limited income multifamily housing residents; (b) to identify perceived energy cost burdens and energy saving efforts of limited income multifamily housing residents; and (c) to identify determinants of perceived energy cost burdens, energy saving efforts, and interest in additional energy saving information of limited income multifamily housing residents. In Spring 2005, a one-page questionnaire was administered to participants of Virginia Extension nutrition programs and 823 usable responses were collected. The major findings were as follows: (a) compared with single-family housing residents, multifamily housing residents tended to perceive fewer energy cost burdens, engage in more daily energy saving behaviors, and inquire less about future energy savings; (b) being headed by a single adult, the existence of a child at home, and dwelling location were significant determinants of perceived energy cost burdens and energy saving efforts; (c) perceived energy cost burdens were found to have significant positive influences on inquiry for future energy savings; and (d) perceived energy cost burdens and inquiry for future energy savings showed significant negative correlations with interest in further energy saving information. The researchers recommended the development and implementation of energy saving education that is applicable for the situations of multifamily housing residents with limited incomes.*

---

## Introduction

For many households, the energy portion of the household budget has grown during the last several years. The Joint Center for Housing Studies of Harvard University (2006) indicated that some 2.5 million households in the lowest income

---

Hyun-Jeong Lee is Assistant Professor and Extension Housing Specialist, Department of Family, Youth and Community Sciences, University of Florida, Gainesville, FL; and JoAnn Emmel is Associate Professor, Department of Apparel, Housing, and Resource Management, Virginia Tech, Blacksburg, VA.

quadrant found home energy costs to make up over 30% of their 2003 budget, which was before the more recent steep increases in oil prices.

Obviously, energy cost has a major influence on housing affordability issues for many limited income households. Energy saving practices and the condition of the residential structure are additional factors associated with the level of household energy expenditures. In spite of the importance of the energy expenditure on a household's housing affordability, there has been a limited number of recent research studies conducted to explore determinants or influences of energy cost burdens or energy saving practices. This study focuses on exploring the determinants of energy saving practices of limited income multifamily housing residents in Virginia.

### **Multifamily Housing and Energy**

In the U. S. the ownership of a single-family house is an important housing norm (Beamish, Goss, & Emmel, 2001; van Vliet, 1998). The U.S. Census Bureau (2000) indicates that 67% of occupied units in this country are single-family homes and 57% are single-family home units occupied by owners. However, more than a quarter of the occupied housing units in the country are multifamily units occupied by either homeowners or renters (U.S. Census Bureau, 2000).

Previous research studies found that the energy practices of multifamily housing residents were influenced by the motivation to save energy. From a conservation perspective, one could easily speculate that households who do not pay for energy use directly would have no incentive to conserve energy compared to those who pay for energy use directly. Levinsen and Niemann (2003) reported that over one fourth of U.S. apartments included utility costs in the rent payment. Among low-income households the figure was somewhat lower. The National Energy Assistance Director's Association (NEADA) studies of Low Income Home Energy Assistance Program (LIHEAP) households found that only 6% of the 2003 survey participants and 7% of the 2005 survey participants who lived in rentals had their heat included in the rent (NEADA, 2005). Using data from the Department of Energy's Residential Energy Consumption Survey (RECS) and the American Housing Survey, Levinsen and Niemann (2003) found that renters of apartment units with heat included in their rent payment kept their apartments warmer and used more energy than those who had their heat metered separately. They concluded that renters who paid a heating bill were more likely to turn down the thermostat when they left home because the temperature difference between renters with and without heating bills was largest when no one was home.

Overall, owners of single-family homes used multiple energy conserving behaviors more often than renters (Crites & Haldeman, 1994). As for use of energy conserving behavioral measures, a study of U.S. owners and renters (Shugoll Research, 2003) found renters significantly less likely to adjust their thermostats

to minimize energy use. For some, this may be related to the fact they do not pay for energy costs outside of their rent so they pay little attention to conservation. It might also mean that these households had already set thermostats at their minimum level and therefore, had fewer opportunities for cutting back. In addition, these renters were less likely to encourage family members to conserve.

Another factor that was considered to have an influence on the energy practices of multifamily housing residents, especially multifamily housing renters, was potential for home improvements to conserve energy. In comparison with homeowners, not only do renters have less freedom for such measures but are also less able to afford such measures (Tyler, Lovingood, Bowen, & Tyler, 1982). As a result, the incorporation of such devices as programmable thermostats, motion detectors, or light sensors into the home was also significantly less likely among renters (Shugoll Research, 2003), especially low-income renters. Most renters rely on the property owners for any major improvements that could improve the efficiency of the dwelling because they were unable or unwilling to do so.

When energy prices begin to rise, renters and low-income households often are faced with choices they must consider. Frequently the choice is between rent, food, or heat. In the last couple of years, energy costs have increased significantly. A 2003 survey (NEADA, 2004) of LIHEAP participants revealed that 53% of the renters, compared to 38% of the homeowners, needed to borrow money from a friend in order to pay their energy bills. In addition, 56% of the renters paid less than the whole amount or skipped paying an energy bill compared to 46% of the homeowners. The research presented in this paper provides additional information about the impact of high energy costs on perceptions of energy cost burden and energy saving practices of limited income multifamily housing residents—both homeowners and renters.

### **Research Purpose and Objectives**

The purpose of this study was to identify energy cost burdens and energy saving practices of Virginia residents with limited incomes, including those living in multifamily housing. There were three research objectives investigated in this paper:

1. To identify demographic and housing characteristics of limited income multifamily housing residents in comparison with those of single-family housing residents;
2. To identify perceived energy cost burdens and energy saving efforts of limited income multifamily housing residents in comparison with those of single-family housing residents; and
3. To identify determinants of perceived energy cost burdens, energy saving efforts, and interests in additional energy saving information of limited income multifamily housing residents.

## Method

### **Data Collection**

The target audience for the study was the population of limited income households who took part in the Virginia Expanded Food Nutrition Education Program (EFNEP)/Smart Choices Nutrition Education Program (SCNEP) in 2005. Multifamily housing residents were among those participating in the program. The program is located at 67 sites in Virginia and all sites were given the opportunity to participate in the study. Site programs are managed by a County Family and Consumer Sciences Extension Agent and/or Area Coordinator and the nutrition information is delivered to the participating households/clients with the help of EFNEP Program Assistants.

A one-page survey instrument with 21 response items was developed for this study. On the suggestion of the State EFNEP Coordinator, the survey was kept to one page so that it would not be too overwhelming to the participants who would be completing the survey. The survey was sent to three local EFNEP Extension agents to pilot test with their participating families. A few suggestions helped refine the questions and content. One suggestion was to give the respondents fewer response choices; thus, the researchers used only three responses for the Likert-type scale instead of the typical five. In addition to general demographic questions, the survey asked respondents to indicate the degree to which they were involved with certain conservation actions, the use of energy information for purchases, and the impact energy costs had on other spending.

A total of 943 responses were collected and 655 responses that were from households in either single-family homes or multifamily homes were found to be useable for further data analyses. Among the 655 responses, 429 (65%) were from households living in single-family homes and 226 (35%) were from multifamily housing residents.

### **Data Analyses**

Data analyses were conducted in two phases. In the first phase, demographic and housing characteristics were compared between single-family housing residents and multifamily housing residents. In this phase, all 655 responses were used. In the second phase, a series of multiple regression analyses were used to identify determinants of perceived energy cost burdens, current energy saving efforts, and interest in additional energy saving information of multifamily housing residents. Only the 226 responses from multifamily housing residents were used in the second phase of data analysis.

There were three housing characteristic variables and three demographic variables used for this analysis. The three housing characteristic variables were home structure type (single-family homes or multifamily homes), homeownership

type (own or rent), and home location (rural or city/town). Demographic variables were monthly household income (\$1,000 or less, or more than \$1,000), whether or not the household was headed by a single-adult (yes or no), and the existence of a child at home (yes or no).

There were 12 statements related to current energy saving behaviors and energy cost burdens. Respondents were asked to rate the statements on a three-level scale: never/seldom (1), sometimes (2), or usually/always (3). After various attempts to explore underlying dimensions of the 12 energy items, the researchers concluded that it was most reasonable to combine seven items into three new variables: perceived energy cost burdens (Burden), daily basic energy saving behaviors (Efficiency-Behavior), and active inquiry to save energy in the future (Efficiency-Inquiry). Three new composite variables were comprised of the mean scores of items included in each of the new variables. The new variable Burden includes three original items: “Energy costs are a problem for my family,” “We need to borrow money in order to pay our energy bills,” and “We cut back on essentials, like food and medicine, in order to pay our energy bills.” Efficiency-Behavior includes two original items that were related to daily behavioral efforts to save energy: “My family turns off lights when they leave a room” and “My family turns off the TV when no one is watching.” These types of efforts are easy for any household member to perform everyday and will influence current energy bills. Efficiency-Inquiry included two original items that were related to active inquiry to save energy for the near future: “I try to find information on how I can save energy in my home” and “I check for energy efficiency, like the Energy Star label, when I buy a product that uses energy.” Such practices are related to active investigation of energy saving information and application of the knowledge in their consumer behaviors. These efforts could be mainly made by adult households who are making decisions for purchase of products that use energy. Although these purchases may not influence current energy bills, they will impact future energy savings. There was also a statement that asked about respondents’ interest in additional information to save energy (More-Info): “Would you be interested in more information on how to lower energy costs?” This statement was rated on a three-level scale: no (1), maybe (2), or yes (3).

## Results

### **Overview of Respondents**

Among the 655 households who lived in either single-family homes or multifamily homes, 50% owned their homes and 57% were living in city or town locations. Fifty-two percent of the households had a monthly income of \$1,000 or less and 49% of them were headed by a single-adult. Eighty-four percent of the households had one or more children at home. The mean score of Burden

was 1.50, Efficiency-Behavior was 2.35, Efficiency-Inquiry was 1.91, and More-Info was 1.37. Considering the rating scale of the original items in the composite variables, respondents sometimes perceived energy cost burdens, and they were usually or almost always making daily efforts or active inquiry to reduce their energy costs. However, they were not very interested in additional information on saving energy.

### ***Comparing Demographic and Housing Characteristics of Multifamily Households to Single-Family Households***

To understand the demographic and housing characteristics of the limited income multifamily housing residents, their characteristics were compared with those of single-family housing residents. Three demographic characteristics (household income, whether or not a single-adult headed the household, and the existence of a child at home) and two housing characteristics (tenure type and location) were compared across home structure types using chi-square tests of independence. In interpreting significant Pearson chi-square, a contingency table with observed frequencies and expected frequencies is used. If categorical variables used for a chi-square test were independent of each other, which means they were not influenced by each other, the proportion of observed frequencies of a categorical variable should be consistent on the other variable(s). For example, as shown in Table 1, 52% of total respondents had a monthly household income of \$1,000 or less and 48% had a monthly income of more than \$1,000. If household income was independent of home structure type, there should be 52% of the households with a monthly income \$1,000 or less and 48% of households with a monthly income of more than \$1,000 regardless of the home structure type. Expected frequencies in the contingency table were the numbers of cases that were expected when two (or more) categorical variables were independent of each other.

Table 1 includes the comparisons of demographic characteristics and Table 2 has comparisons of housing characteristics across the two home structure types. It was found that among respondents living in multifamily homes there were significantly more households than expected who had a monthly income of \$1,000 or less, significantly more households headed by a single-adult, and significantly fewer households with one or more children at home when each of the demographic characteristics were independent of home structure type (Table 1). Also, there were more renters and more households living in city or town locations among multifamily housing residents than expected (Table 2), and a majority (97%) of the respondents living in multifamily housing were renters and only five respondents owned their current multifamily residence.

**Table 1. Contingency Table: Home Structure Types and Demographic Characteristics**

Demographic Characteristic	Home Structure Type		Total
	Multifamily Home	Single-Family Home	
Household monthly income <sup>A</sup>			
\$1,000 or less			
Observed <i>n</i>	141	165	306
[Expected <i>n</i> ]	[103]	[202]	
(Valid %)	(71)	(43)	(52)
More than \$1,000			
Observed <i>n</i>	57	221	278
[Expected <i>n</i> ]	[94]	[184]	
(Valid %)	(29)	(57)	(48)
Total	198	386	584
Single-adult headed household <sup>B</sup>			
Yes			
Observed <i>n</i>	139	162	301
[Expected <i>n</i> ]	[103]	[198]	
(Valid %)	(67)	(40)	(49)
No			
Observed <i>n</i>	70	239	309
[Expected <i>n</i> ]	[106]	[203]	
(Valid %)	(34)	(60)	(51)
Total	209	401	610
Existence of a child <sup>C</sup>			
Yes			
Observed <i>n</i>	92	195	287
[Expected <i>n</i> ]	[102]	[185]	
(Valid %)	(75)	(89)	(84)
No			
Observed <i>n</i>	30	25	55
[Expected <i>n</i> ]	[20]	[35]	
(Valid %)	(25)	(11)	(16)
Total	122	220	342

<sup>A</sup>  $\chi^2(1, N = 584) = 42.516, p = .000$

<sup>B</sup>  $\chi^2(2, N = 610) = 37.467, p = .000$

<sup>C</sup>  $\chi^2(1, N = 342) = 10.173, p = .001$

Note: Percents are valid percents of observed frequencies within each home structure type. Total of percents may not be 100 due to rounding.

**Table 2. Contingency Table: Home Structure Types and Housing Characteristics**

Housing Characteristic	Home Structure Type		Total
	Multifamily Home	Single-Family Home	
Tenure type <sup>A</sup>			
Own			
Observed <i>n</i>	5	286	291
[Expected <i>n</i> ]	[99]	[193]	
(Valid %)	(3)	(74)	(50)
Rent			
Observed <i>n</i>	194	103	297
[Expected <i>n</i> ]	[101]	[197]	
(Valid %)	(98)	(27)	(51)
Total	199	389	588
Dwelling location <sup>B</sup>			
Rural			
Observed <i>n</i>	32	225	257
[Expected <i>n</i> ]	[88]	[169]	
(Valid %)	(15)	(55)	(41)
City/town			
Observed <i>n</i>	180	184	364
[Expected <i>n</i> ]	[124]	[240]	
(Valid %)	(85)	(45)	(59)
Total	212	409	621

<sup>A</sup>  $\chi^2(1, N = 588) = 265.559, p = .000$

<sup>B</sup>  $\chi^2(2, N = 621) = 91.717, p = .000$

Note: Percents are valid percents of observed frequencies within each home structure type. Total of percents may not be 100 due to rounding.

### **Comparing Energy Cost Burdens and Energy Saving Efforts of Multifamily Households to Single-Family Households**

To identify perceived energy cost burdens, energy saving efforts, and interest in additional energy saving information, mean scores of Burden, Efficiency-Behavior, Efficiency-Inquiry, and More-Info of multifamily housing residents were compared with those of single-family housing residents using independent sample *t*-tests. It was found that there were significant differences in Burden, Efficiency-Behavior, and Efficiency-Inquiry between multifamily housing residents and single-family housing residents while there was no difference in More-Info (see Table 3 for the comparisons). Multifamily housing residents tended to perceive less energy cost burdens and made more daily basic energy saving efforts to reduce current energy bills. However, multifamily housing residents were found to be less likely

to inquire about ways to save energy or seek energy ratings, like the Energy Star label, when purchasing items compared to single-family housing residents.

**Table 3. Independent Sample *t*-test: Home Structure Types and Energy Cost Burdens and Energy Saving Efforts**

Variable	Home Structure Type	
	Multifamily Home	Single-Family Home
Burden <sup>A</sup>	1.41	1.54
Efficiency-Behavior <sup>B</sup>	2.42	2.31
Efficiency-Inquiry <sup>C</sup>	1.68	2.03

<sup>A</sup>  $t(653) = -3.178, p = .002$

<sup>B</sup>  $t(653) = 2.272, p = .023$

<sup>C</sup>  $t(653) = -6.579, p = .000$

Note: Only variables with significant *ts* are presented. Variables used are composite variables that have mean scores of items included. Judgments of the original variables were made on a 3-level scale: never/seldom (1), sometimes (2), and usually/almost always (3).

### ***Determinants of Energy Perceptions and Practices of Multifamily Housing Residents***

To arrive at determinants of perceived energy saving costs, energy saving efforts, and interest in additional energy saving information, multiple regression analyses were used with 226 responses from multifamily housing residents. Five dichotomous demographic and housing variables were converted into five dummy variables. The five dummy variables included in the regression analyses were as follows:

Household monthly income: \$1,000 or less

Single-adult headed household: Yes

Existence of a child: Yes

Tenure type: Homeowner

Dwelling location: Rural

Four multiple regression models were tested. The first three models tested the influence of demographic and housing characteristics on perceived energy cost burdens, basic energy saving behaviors, and active energy saving inquiry. For each of the three models, Burden, Efficiency-Behavior, and Efficiency-Inquiry were used as dependent variables, and five demographic and housing dummy variables were included as independent variables. The last regression model tested the influence of demographic and housing characteristics, perceived energy cost burdens, current energy saving behaviors, and interest in further energy saving information. For the last model, More-Info was a dependent variable and the five dummy variables, Burden, Efficiency-Behavior, and Efficiency-Inquiry were used as independent variables. Stepwise methods were used in all regression

models. As a result, it was found that a linear combination of existence of a child at home and whether or not the household was headed by a single-adult was a significant determinant of Burden, that only dwelling location was a significant determinant of Efficiency-Behavior, that only existence of a child was a significant determinant of Efficiency-Inquiry, and that only Efficiency-Inquiry was a significant determinant of More-Info. Refer to Table 4 for a summary of the final four regression models.

**Table 4. Summary of Multiple Regression Analysis Models: Multifamily Housing Residents Only**

	Multiple Regression Analysis Model			
	Model 1	Model 2	Model 3	Model 4
Dependent variable	Burden <sup>a</sup>	Efficiency-Behavior <sup>a</sup>	Efficiency-Inquiry <sup>a</sup>	More-Info <sup>b</sup>
ANOVA <i>F</i>	6.334**	6.415*	4.241*	9.332**
Regression coefficient <sup>c</sup>				
Constant	1.292	2.402	1.364	1.883
Single-adult headed household: Yes <sup>d</sup>	-0.213			
Existence of a child: Yes <sup>e</sup>	0.310		0.265	
Dwelling location: Rural <sup>f</sup>		-0.772		
Efficiency-Inquiry <sup>a</sup>	(n/a)	(n/a)	(n/a)	-0.361
<i>R</i>	.353	.258	.212	.308
<i>R</i> <sup>2</sup>	.125	.067	.045	.095

\*  $p < .05$ ; \*\*  $p < .01$

<sup>a</sup> Composite variables that have mean score of original items included. Judgments of the original variables were made on a 3-level scale: never/seldom (1), sometimes (2), and usually/almost always (3).

<sup>b</sup> This variable is included only in Model 4. Judgments were made on a 3-level scale: no (1), maybe (2), and yes (3).

<sup>c</sup> Only regression coefficients of variables significant in the final stepwise model of each regression analysis model are presented.

<sup>d</sup> Dummy variable whose value is 1 for a household that was headed by single-adult and 0 for other.

<sup>e</sup> Dummy variable whose value is 1 for a household with one or more children at home and 0 for other.

<sup>f</sup> Dummy variable whose value is 1 for a rural location and 0 for other.

**Model 1.** To see regression coefficients of the first model, a household that had two or more adults or that had one or more children at home tended to perceive greater energy cost burden than other households. To see *R* square, a linear combination of being headed by single-adult and having one or more child at home explained 12.5% of the variance in perceived energy cost burdens. That is, 87.5% of the variance in the perceived energy cost should be explained by variables that were not included in the regression model.

**Model 2.** It was found that households that lived in rural locations tended to make fewer basic energy saving efforts to reduce their current energy costs than those who lived in city or town locations. Being in a rural location explained 6.7% of the variance in basic energy saving behaviors.

**Model 3.** From Model 3, it was found that households with one or more children were likely to make efforts to seek and apply energy saving information to reduce energy costs in the near future. However, the difference in the value of Efficiency-Inquiry that was predicted from this regression model between households that had any children at home and those without a child were very small. Also, having any children at home explained only 4.5% of the variance in Efficiency-Inquiry.

**Model 4.** The finding from the last regression model was somewhat contradictory. To see the regression coefficients of the last regression model, households who were more actively seeking more ways to save energy were less interested in additional energy saving information. This regression model explained 9.5% of the variance in More-Info.

To examine the relationship between each pair of Burden, Efficiency-Behavior, Efficiency-Inquiry, and More-Info of multifamily housing residents, additional bivariate correlations were tested. Reference Table 5 for the correlation analyses results. Interestingly, households that had greater energy cost burdens showed a tendency to make fewer basic daily energy saving efforts such as turning off TVs or lights and to be less interested in additional energy saving information. However, they were found to have a greater tendency to inquire about future energy savings. Contradictorily, the more a household inquired about future energy savings, the less the household was interested in additional energy-saving information. This is consistent with the findings from the last regression model.

**Table 5. Bivariate Correlations: Perceived Energy Cost Burdens and Energy Saving Efforts of Multifamily Housing Residents**

	Burden	Efficiency-Behavior	Efficiency-Inquiry	More-Info
Burden <sup>A</sup>			.183**	-.166*
Efficiency-Behavior <sup>A</sup>			-.015	.065
Efficiency-Inquiry <sup>A</sup>	1	-.204**	1	-.244**
More-Info <sup>B</sup>				1

\*  $p < .05$ ; \*\*  $p < .01$

<sup>A</sup> Composite variables that have mean score of original items included. Judgments of the original variables were made on a 3-level scale: never/seldom (1), sometimes (2), and usually/almost always (3).

<sup>B</sup> Judgments were made on 3-level scale: no (1), maybe (2), and yes (3).

### **Summary of Findings**

Compared to the demographic and housing characteristics of single-family housing residents, multifamily housing residents were characterized as having a lower household income, more households headed by a single-adult, and more households without a child at home. Multifamily residents were also more often renters who lived in city or town locations. Multifamily housing residents tended to perceive fewer energy cost burdens, exhibit more daily energy saving behaviors, and inquire less frequently about future energy savings than single-family housing residents. It was found that being headed by a single-adult, the existence of a child at home, and dwelling location were significant determinants of perceived energy cost burdens and energy saving efforts of multifamily housing residents. In particular, having one or more children at home was found to significantly increase households' perceived energy cost burdens and to increase their inquiry for future energy savings. The perceived energy cost burdens of a household living in a multifamily unit were found to have a significantly positive influence on inquiries about future energy savings. One of the contradictory findings of this study, however, was that greater perceived energy cost burdens of multifamily housing residents led to fewer daily energy saving behaviors and less interest in further energy saving information. Also, households that inquired more about practices that could save energy in the future tended to be less interested in additional energy saving information.

### **Conclusions**

This research study focused on identifying perceived energy cost burdens and energy saving efforts of limited income multifamily housing residents in Virginia and how they compared to those living in single-family homes. The findings of this study provide some insight into the energy saving practices of limited income multifamily households and how they are impacted by energy costs. The study has limitations in its sampling framework that may come into consideration. The study was conducted in Virginia so the findings may not apply to the general population. The sample was also gathered from a targeted population who were participants of Extension education programs.

Overall, energy costs did not seem to be perceived as a huge burden by most of the respondents, and multifamily residents felt it to be less of a burden than single-family households. It should be noted that in the two years following this study, energy prices have continued to increase. The extent of the perceived burden and interest in more information could be very different if this study was to be repeated now.

It was found that the perceived energy cost burden showed a significant negative correlation with interest in additional energy saving information. That is, households with greater energy cost burdens were less interested in additional

energy saving information. In addition, multifamily housing residents, in comparison to single-family housing residents, see little need to seek energy saving information. A possible explanation for this is that multifamily housing residents perceived additional energy saving information as that related to the purchase of energy saving equipment rather than information for behavior changes and, therefore, of little use to them. These limited income households may feel they are doing all they can and, thus, do not feel they need this information. In addition, respondents may think that collecting energy saving information and participating in educational programs were not worth the effort for the financial savings they would experience, or that they would not significantly reduce their energy cost with one or more behavioral changes. Clearly, more research is needed to study this disconnect between cost burdens and a lack of interest in learning more about how consumers can lower energy costs. Also, more applicable and practical energy saving education programs need to be developed and delivered.

In comparison to single-family housing residents, multifamily housing residents were also making more daily basic energy saving efforts, but again were less likely to inquire about future energy savings and to look for Energy Star qualified products when purchasing. This may be because renters feel less of a need to learn about or purchase items that could impact home energy use. In general, rental units, which make up a major type of multifamily housing in this country, have pre-installed appliances and, therefore, renters are not responsible for adding or changing appliances, heating systems, or cooling systems which have a great impact on the renters' energy bills. Instead, the only way for them to reduce their energy costs is by reducing energy use through such measures as turning off the TV and lights.

Even though more education could help convince all households, especially those with limited incomes, that there are measures beyond what they are already taking that could further reduce energy costs, additional help may be needed. Property owners must be aware that many renters are making efforts to save energy with their energy saving practices, but are limited in what they can do. If property owners are concerned about the impact that energy costs may have on the ability of renters to afford their rent, especially as energy prices rise, property owners should consider assisting renters through improvements to the building. This could include the incorporation of energy efficient equipment when new equipment is needed and making other energy improvements such as insulation, caulking, and weather stripping. A combined effort by renters and property owners will help ensure a more affordable housing situation for renters and a more stable leasing situation for property owners.

## References

- Beamish, J. O., Goss, R. C., & Emmel, J. (2001). Lifestyle influences on housing preferences. *Housing and Society*, 28(1&2), 1-28.
- Crites, A. M., & Haldeman, V. A. (1994). Targeting community energy education programs. *Advancing the Consumer Interest*, 6(2), 21-25.
- Joint Center for Housing Studies of Harvard University. (2006). *State of the nation's housing 2006*. Cambridge, MA: Harvard University.
- Levinson, A., & Niemann, S. (2004). Energy use by apartment tenants when landlords pay for utilities. *Resource and Energy Economics*, 26, 51-75.
- National Energy Assistance Directors Association. (2004, April). *2004 national energy assistance survey: Final report*. Washington, DC: National Energy Assistance Directors Association.
- National Energy Assistance Directors Association. (2005, September). *2005 national energy assistance survey: Final report*. Washington, DC: National Energy Assistance Directors Association.
- Shugoll Research. (2003, July). *Study measuring attitudes and behavior related to energy use and conservation*. Bethesda, MD: Alliance to Save Energy.
- Tyler, L. L., Lovingood, R. P., Bowen, S. P., & Tyler, R. F. (1982). Energy related characteristics of low income urban tenants. *Housing and Society*, 9(3), 9-15.
- U.S. Census Bureau. (2000). *Data sets: Decennial Census*. Retrieved October 8, 2007, from [http://factfinder.census.gov/servlet/DatasetMainPageServlet?\\_ds\\_name=DEC\\_2000\\_SF3\\_U&\\_program=DEC&\\_lang=en](http://factfinder.census.gov/servlet/DatasetMainPageServlet?_ds_name=DEC_2000_SF3_U&_program=DEC&_lang=en)
- van Vliet, W. (Ed.).(1998). *The encyclopedia of housing*. Thousand Oaks, CA: Sage Publications.