
**Energy Consumption and Expenditure Projections
by Population Group on the Basis of the *Annual
Energy Outlook 2001* Forecast**

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Energy Consumption and Expenditure Projections by Population Group on the Basis of the *Annual Energy Outlook 2001* Forecast

by D.A. Poyer

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ON THE BASIS OF THE ANNUAL ENERGY OUTLOOK 2001 FORECAST

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NOTATION

The following is a list of the acronyms, initialisms, and abbreviations (including units of measure) used in this document.

Btu	British thermal unit(s)
DOE	U.S. Department of Energy
LPG	liquefied petroleum gas
RECS	Residential Energy Consumption Survey
yr	year(s)

1993–1997 ENERGY CONSUMPTION AND EXPENDITURE ANALYSIS

by

D.A. Poyer

SUMMARY

The changes in energy use by household population type and income class have been analyzed on the basis of two surveys — the 1993 and 1997 Residential Energy Consumption Surveys (RECSs). The study examined the changes in energy use for non-Hispanic White, non-Hispanic Black, and Hispanic households by income quintile.¹

The analysis identified major differences in the patterns of energy use for non-Hispanic White, non-Hispanic Black, and Hispanic households for both time periods. In general, no substantial changes in overall energy consumption and expenditures occurred between 1993 and 1997. In some cases, however, in particular for distillate fuel and liquefied petroleum gas (LPG), changes in consumption were relatively significant. Further, differences in the patterns of energy use by income class typically were unstable between 1993 and 1997. At times, the relative differences in energy use across population category by income group changed dramatically. Finally, energy expenditures were remarkably stable between 1993 and 1997, and the relative difference in energy expenditures among population groups remained about the same.

In general, the largest changes occurred for minority groups. Some highlights of the analysis, organized by type of energy used and expenditures, are listed below.

- **Electricity**

- In 1993 and 1997, the consumption of electricity for non-Hispanic White households was significantly greater than that in minority households. In 1997, non-Hispanic White households also consumed more electricity, but the difference in electricity consumption between non-Hispanic White and minority households was smaller.
- Between 1993 and 1997, each population group experienced a small increase in the consumption of electricity. The largest increases occurred in minority households.

- **Natural Gas**

- In 1993 and 1997, the consumption of natural gas for non-Hispanic Black households was greater than that for non-Hispanic White households, and

¹ An income quintile is one of five equally divided population classes determined after households have been sorted in ascending order by income. The first, or lowest, income quintile represents 20% of the households with the lowest income, whereas the second-income quintile represents the next 20% of all households ranked by income, and so on.

the difference was statistically significant. In 1997, however, the difference in consumption of natural gas declined.

- In 1993 and 1997, the consumption of natural gas for Hispanic households was less than that for non-Hispanic White households, and the difference was statistically significant. In 1997, the difference in consumption of natural gas increased.
- Between 1993 and 1997, the consumption of natural gas declined for all households. The largest decrease occurred in non-Hispanic Black households.

- **Distillate Fuel**

- In 1993 and 1997, the consumption of distillate fuel for non-Hispanic White households was substantially greater than that in minority households.
- In 1993, the consumption of distillate fuel for non-Hispanic White households was greater than that for non-Hispanic Black households for each income class. In 1997, consumption of distillate fuel for non-Hispanic White households was greater than that for non-Hispanic Black households in each income class, except for the fourth-income quintile.
- In 1997, the difference in the consumption of distillate fuel between non-Hispanic White and non-Hispanic Black households declined, but it continued to be significant.
- In 1997, the difference in the consumption of distillate fuel between non-Hispanic White and Hispanic households increased.
- Between 1993 and 1997, a small decrease occurred in the overall consumption of distillate fuel. Hispanic households experienced a significant decline in the consumption of distillate fuel. Non-Hispanic White and non-Hispanic Black households showed modest changes in the consumption of distillate fuel, with a slight decrease for non-Hispanic White households and a slight increase for non-Hispanic Black households.

- **Liquefied Petroleum Gas**

- In 1993 and 1997, the consumption of LPG for non-Hispanic White households was substantially greater than that in minority households at the population group level and within each income class.
- In 1997, the difference in the consumption of LPG between non-Hispanic White and minority households narrowed slightly, but it continued to be significant.

- Between 1993 and 1997, in general, the overall consumption of LPG decreased. However, consumption of LPG for non-Hispanic White and Hispanic households decreased, and consumption of LPG for non-Hispanic Black households increased slightly.

- **Energy Expenditures**

- In 1993 and 1997, the average energy expenditures for non-Hispanic White households were greater than those for minority households.
- In 1993 and 1997, at the income-class level, the total energy expenditures for Hispanic households were substantially less than those for non-Hispanic White households.
- In 1993, non-Hispanic Black households incurred higher energy expenditures than non-Hispanic White households in three of five income-class categories, and in 1997, in four of five income-class categories.
- Between 1993 and 1997, the changes in average household energy expenditures were minimal. The largest increase in energy expenditures occurred for non-Hispanic Black households. For non-Hispanic White and Hispanic households, energy expenditures decreased slightly.
- In 1993 and 1997, the lowest-income quintile spent a substantially larger share of its household income on energy — six to eight times more than was spent by the highest-income quintile.
- In 1993 and 1997, the three population groups showed minor differences in the overall share of income spent on energy, although non-Hispanic Black households spent a larger share of household income on energy than did other population groups.
- In 1993 and 1997, the share of income spent on energy by non-Hispanic Black households was generally higher within income class. The share of income spent on energy by non-Hispanic Black households in the lowest-income quintile was more than 25% greater than that for non-Hispanic White households in the lowest-income quintile.
- In 1993 and 1997, at the income-class level, the share of income spent on energy by Hispanic households was less than that by non-Hispanic White households at each income level.
- Between 1993 and 1997, changes in the overall energy expenditure share for minority households were closely related to changes in the distributions of households by income class.
- Between 1993 and 1997, for Hispanic households, the overall energy expenditure share of income increased slightly; however, energy expenditure shares of income fell in each income category.

- Between 1993 and 1997, for non-Hispanic Black households, the overall energy expenditure share of income decreased slightly; however, energy expenditure shares increased in each income category, except for the second-income quintile.

ABSTRACT

The changes in the patterns of energy use and expenditures by population group are analyzed by using the 1993 and 1997 Residential Energy Consumption Surveys. Historically, these patterns have differed among non-Hispanic White households, non-Hispanic Black households, and Hispanic households. Patterns of energy use and expenditures are influenced by geographic and metropolitan location, the composition of housing stock, economic and demographic status, and the composition of energy use by end-use category. As a consequence, as energy-related factors change across groups, patterns of energy use and expenditures also change. Over time, with changes in the composition of these factors by population group and their variable influences on energy use, the impact on energy use and expenditures has varied across these population groups.

1 INTRODUCTION

The U.S. Department of Energy (DOE), Office of Economic Impact and Diversity, supports research to create analytical tools, models, and other methods for comparing energy use and expenditures in minority households with those of other households. The purpose of this research is to study and compare the ways in which patterns of residential energy use and expenditures have changed across population groups between the 1993 Residential Energy Consumption Survey (RECS) and the 1997 RECS (DOE 1995, 2000). The interest in assessing these changes is motivated by the persistence over time of differences in patterns of energy use among non-Hispanic White, non-Hispanic Black, and Hispanic households. This report discusses the changes in such patterns between the two surveys.

Energy use and expenditures, as well as their changes, have been studied for three population groups: non-Hispanic White, non-Hispanic Black, and Hispanic households. The research has relied primarily on descriptive statistical analyses. Differences in patterns of energy use among various demographic groups have been well documented in the literature (Poyer and Williams 1993; Poyer et al. 1997; Poyer and Allison 1998; Poyer and Balsley 1999). Energy consumption and expenditures differ among population groups for many reasons. Such factors as geographic and metropolitan location, home type, socioeconomic status, weather, patterns of energy use by end-use category, and personal or cultural preferences create variations in the type and amount of energy consumed.

The RECS, formerly conducted annually, is now conducted every four years and is administered by the Energy Information Administration. Estimates of energy use by population category from the 1993 and the 1997 RECS were used in this study. These estimates were compared to determine whether any distinctive differences in energy-use patterns were evident between the two periods across population groups.

Section 2 presents a comparative analysis of energy use for the 1993 and 1997 RECS by residential energy source — electricity, natural gas, distillate fuel, and liquefied petroleum gas (LPG). The analysis presents a comparison by population group — non-Hispanic White,

non-Hispanic Black, and Hispanic households — and by income class as defined by quintile membership. Sections 3 and 4 present a comparative analysis of total energy expenditures by population group and by share of household income, respectively. Section 5 discusses the results of the analysis.

2 ENERGY CONSUMPTION AND POPULATION GROUP

As documented in earlier research, patterns of energy use differ among non-Hispanic White, non-Hispanic Black, and Hispanic households. They can be explained in part by population differences in energy-related variables. However, even when held constant, differences in the use of residential energy still exist. The following sections discuss the changes in energy consumption among population groups and between the 1993 and 1997 RECSs by residential energy source. Sections 2.1 through 2.4 discuss the changes that occurred in the use of electricity, natural gas, distillate fuel, and LPG, respectively.

2.1 ELECTRICITY USE

Of the four major residential energy sources (electricity, natural gas, distillate fuel, and LPG), electricity is the fastest growing in the United States. American households spend more than 60% of their energy budgets on electricity. Except for some variations, this figure is similar across population groups and income classes. In 1997, on an annual basis, the average American household spent \$870 on electricity out of a residential energy budget of \$1,340, or approximately \$90 billion per year nationally.

Tables 1 through 8 and Figures 1 and 2 show electricity consumption, and the differences and changes in electricity consumption across groups and between surveys. (For ease in comparison, all tables and figures are included at the end of each subsection.) Tables 1 through 4 show that, regardless of group, the consumption of electricity increases as income quintile increases. In both 1993 and 1997, the average household consumption of electricity for non-Hispanic Blacks and Hispanics was less than that for non-Hispanic Whites. This disparity in consumption, in particular for non-Hispanic Whites and Blacks, is closely related to differences in income.

In 1993 and 1997, the difference in average household electricity consumption between non-Hispanic Whites and both non-Hispanic Blacks and Hispanics was statistically significant. On average in 1993, non-Hispanic Black households consumed 19% less electricity than did non-Hispanic White households, and Hispanic households consumed 29% less electricity. These differences also decreased in 1997. On average in 1997, electricity consumption by non-Hispanic Blacks and Whites decreased by 5% (from 19% in 1993 to 14% in 1997); however, the difference in electricity consumption in 1997 remained high for Hispanics and non-Hispanic Whites — 27% (Tables 1 through 5).

The difference in electricity consumption between population groups at the income-class level was not as great among population groups, especially for non-Hispanic White and Black households. The differences between non-Hispanic White and Black households were statistically insignificant at every income-class level in both 1993 and 1997. In 1993, the differences ranged from 3.5% for the lowest-income quintile to 16% for the highest-income quintile. In 1997, the overall and income-class-specific differences in electricity consumption

fell for non-Hispanic White and Black households (Figure 1). The differences ranged from 4% in the second- and fourth-income quintile groups to 14% in the highest-income quintile group.²

For non-Hispanic White and Hispanic households, the income-class level differed from that for non-Hispanic White and Black households. The differences in electricity consumption were also relatively large at the income-class level. For each income class, as for non-Hispanic Black households, the estimated average electricity consumption for Hispanic households was smaller than that for non-Hispanic White households. In 1993, however, unlike that for non-Hispanic Black households, some of the differences within income class were statistically significant. For example, the differences in consumption of electricity for Hispanic and non-Hispanic White households were statistically significant in the first three income quintile groups (Table 3). The estimated differences ranged from 19% for the fourth-income quintile group to 30% for the third-income quintile group. In 1997, the overall and income-class-specific differences in electricity consumption between non-Hispanic White and Hispanic households fell slightly (Figure 2). In 1997, the differences ranged from 15% in the third-income quintile group to 24% in the second-income quintile group, and none of the income-class differences in electricity consumption, between Hispanics and non-Hispanic Whites, was statistically significant (Table 5).

Between 1993 and 1997, each population group showed a small increase in electricity consumption, except for the third-income quintile (middle-income) group. The overall decline in electricity consumption in the third-income quintile resulted from a reduction in the consumption of electricity by middle-income non-Hispanic White households. The average household electricity consumption fell slightly for Hispanics in the fourth-income quintile group. However, the changes in electricity consumption between 1993 and 1997 were statistically insignificant (Table 7).

TABLE 1 RECS Electricity Consumption, 1993
(million Btu/household per yr)

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	25.90	24.99	18.39	24.82
Quintile 2	29.89	25.92	22.47	28.57
Quintile 3	37.10	32.02	26.04	35.75
Quintile 4	38.84	35.48	31.31	37.78
Quintile 5	44.84	37.67	34.96	43.11
U.S. average	35.92	28.96	25.54	34.01

Source: DOE (1995).

² The estimated differences in electricity consumption between 1993 and 1997 were statistically insignificant in every case (Tables 7 and 8).

TABLE 2 Difference in Electricity Use between Non-Hispanic White and Minority Households, 1993 (million Btu/household per yr)

Income Class	Non-Hispanic Black	Hispanic
Quintile 1	-0.91	-7.51 ^a
Quintile 2	-3.97	-7.42 ^a
Quintile 3	-5.08	-11.06 ^a
Quintile 4	-3.36	-7.53
Quintile 5	-7.17	-9.88
U.S. average	-6.96^a	-10.38^a

^a The difference in consumption between groups was statistically significant at the 0.05% level.

Source: DOE (1995).

TABLE 3 Percentage Difference in Electricity Use between Non-Hispanic White and Minority Households, 1993

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	-3.51	-29.00
Quintile 2	-13.28	-24.82
Quintile 3	-13.69	-29.81
Quintile 4	-8.65	-19.39
Quintile 5	-15.99	-22.03
U.S. average	-19.38	-28.90

Source: DOE (1995).

**TABLE 4 RECS Electricity Consumption, 1997
(million Btu/household per yr)**

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	26.97	25.07	20.83	25.51
Quintile 2	33.00	31.79	25.02	31.48
Quintile 3	34.69	32.40	29.47	33.58
Quintile 4	39.76	38.13	30.92	38.24
Quintile 5	47.34	40.73	38.91	45.46
U.S. average	37.01	31.70	27.11	34.85

Source: DOE (2000).

**TABLE 5 Difference in Electricity Use between Non-Hispanic White and Minority Households, 1997
(million Btu/household per yr)**

Income Class	Non-Hispanic Black	Hispanic
Quintile 1	-1.90	-6.14
Quintile 2	-1.21	-7.98
Quintile 3	-2.29	-5.22
Quintile 4	-1.63	-8.84
Quintile 5	-6.61	-8.43
U.S. average	-5.31 ^a	-9.90 ^a

^a The difference in consumption between groups was statistically significant at the 0.05% level.

Source: DOE (2000).

TABLE 6 Percentage Difference in Electricity Use between Non-Hispanic White and Minority Households, 1997

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	-7.04	-22.77
Quintile 2	-3.67	-24.18
Quintile 3	-6.60	-15.05
Quintile 4	-4.10	-22.23
Quintile 5	-13.96	-17.81
U.S. average	-14.35	-26.75

Source: DOE (2000).

TABLE 7 Change in Electricity Consumption, 1993–1997^a (million Btu/household per yr)^a

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	1.07	0.08	2.44	0.69
Quintile 2	3.11	5.87	2.55	2.91
Quintile 3	-2.41	0.38	3.43	-2.17
Quintile 4	0.92	2.65	-0.39	0.46
Quintile 5	2.50	3.06	3.95	2.35
U.S. average	1.09	2.74	1.57	0.84

^a The change in electricity consumption between 1993 and 1997 was statistically insignificant at the 0.05% level in all cases.

Sources: DOE (1995, 2000).

TABLE 8 Percentage Change in Electricity Consumption, 1993–1997

Income Class	Non-Hispanic White (%)	Non-Hispanic Black (%)	Hispanic (%)	All (%)
Quintile 1	4.1	0.3	13.3	2.8
Quintile 2	10.4	22.6	11.3	10.2
Quintile 3	-6.5	1.2	13.2	-6.1
Quintile 4	2.4	7.5	-1.2	1.2
Quintile 5	5.6	8.1	11.3	5.5
U.S. average	3.0	9.5	6.1	2.5

Sources: DOE (1995, 2000).

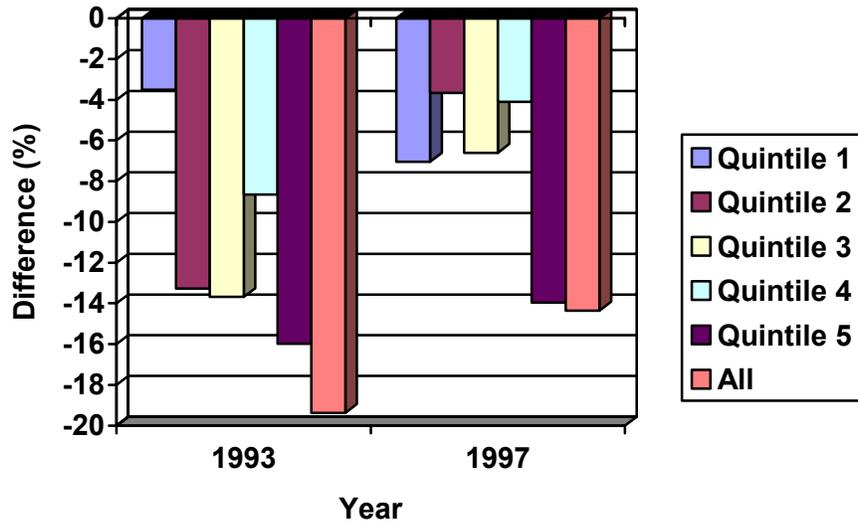


FIGURE 1 Comparative Differences in Electricity Consumption for Non-Hispanic White and Non-Hispanic Black Households Decreased between 1993 and 1997

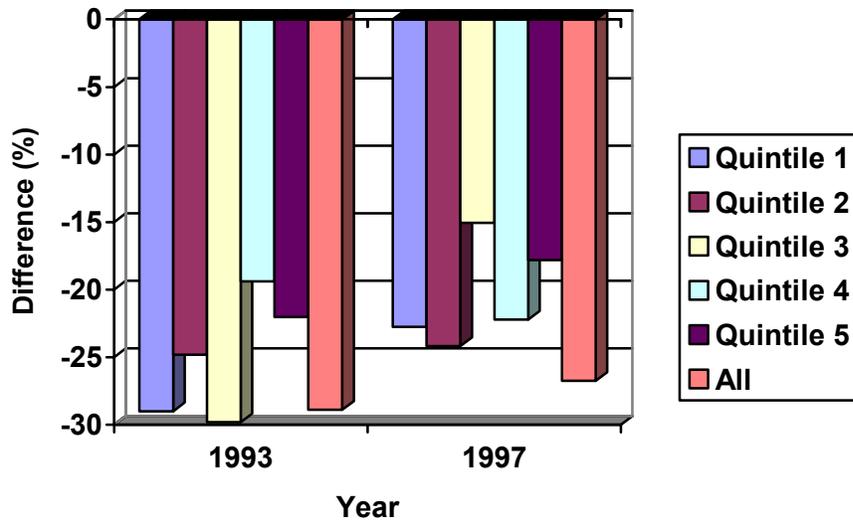


FIGURE 2 Comparative Differences in Electricity Consumption for Non-Hispanic White and Hispanic Households Decreased between 1993 and 1997

2.2 NATURAL GAS USE

Natural gas is a very important source of energy for residential use. Its incidence of use for space and water heating exceeds that of all other energy sources. In both 1993 and 1997, in more than 50% of all households, natural gas was the primary space and water heating fuel, and for non-Hispanic Black households, the number was more than 60% in 1993 and just slightly under that value in 1997.

Tables 9 through 16 and Figures 3 and 4 show natural gas consumption, as well as differences and changes in natural gas consumption across groups and between surveys. As for electricity, natural gas consumption typically increased with income quintile (Tables 9 and 12), although the relationship between income and consumption was not as strong. The relative level of natural gas consumption among the three population groups differed from that of electricity. In both 1993 and 1997, the average household consumption of natural gas for non-Hispanic Blacks was greater than, and for Hispanics was less than, that for non-Hispanic Whites.

In 1993 and 1997 as for electricity, the difference in natural gas consumption between non-Hispanic White and both non-Hispanic Black and Hispanic households was statistically significant. In 1993, the average natural gas consumption for non-Hispanic Black households was 31% greater than and 18% less than the natural gas consumption for non-Hispanic White and Hispanic households, respectively. In 1997, the difference in natural gas consumption between non-Hispanic White and Black households declined. In that year, natural gas consumption for non-Hispanic Black households was 26% greater than the natural gas consumption for non-Hispanic White households. Between 1993 and 1997, natural gas consumption fell for Hispanic households compared with non-Hispanic White households. In 1997, natural gas consumption in Hispanic households was 23% less than that for non-Hispanic White households compared with 18% in 1993 (Tables 11 through 14).

Considerable variations occurred in the level of natural gas consumption among population groups at the income-class level, especially for non-Hispanic White and Black households. In 1993, the differences in natural gas consumption between non-Hispanic White and Black households were statistically significant for the first-, second-, and fourth-income quintile groups. Average natural gas consumption for non-Hispanic Black households ranged from slightly less for the third-income quintile to 30% greater for the second-income quintile than for non-Hispanic White households in 1993. In 1997, the large disparity in natural gas consumption between non-Hispanic Black and White households persisted; however, the details differed slightly. The differences between the first- and fourth-income quintile groups remained statistically significant; however, the difference for the second-income quintile group was no longer significant at the 0.05% level. In 1997, the overall and income-class specific differences in natural gas consumption fell for non-Hispanic White and Black households (Figure 3); however, the relative differences remained very large.

The consumption of natural gas for non-Hispanic White and Hispanic households varied widely at the income-class level. In 1993, this variation ranged from nearly identical levels of consumption for Hispanic and non-Hispanic White households in the first-income quintile to consumption in Hispanic households being 25% less than for non-Hispanic Whites in the fifth-income quintile. At the income-class level, natural gas consumption in Hispanic households typically was less than that for non-Hispanic White households. In 1993, however, this

difference was statistically significant only for the fifth-income quintile (Table 10). In 1997, despite an increase in the overall disparity in natural gas consumption for non-Hispanic Whites and Hispanics, no statistically significant differences existed at the income-class level (Table 13). In 1997, the differences in natural gas consumption between Hispanic and non-Hispanic White households were relatively uniform at the income-class level. Natural gas consumption in Hispanic households at each income-class level was less than that in non-Hispanic White households, from 4% in the fifth-income quintile to 14% in the fourth-income quintile. Between 1993 and 1997, a significant change occurred in relative natural gas consumption in the highest-income quintile group, and the relative difference in consumption dropped by 50%. In 1993, natural gas consumption in the highest-income Hispanic households was 36% less than that for non-Hispanic White households (and statistically significant), but only 18% less than for non-Hispanic White households in 1997 (Tables 11 and 14).

Between 1993 and 1997, natural gas consumption decreased slightly in each population group, and except for the fourth-income quintile, it decreased for each income quintile. The increase in consumption in the fourth-income quintile was driven by the increase in the use of natural gas for non-Hispanic White and Black households. In addition, for non-Hispanic Black households in the third-income quintile (and for Hispanics in the highest-income quintile), the natural gas consumption is estimated to increase. However, at the income-class level, the changes in natural gas consumption between 1993 and 1997 were statistically significant only for non-Hispanic Whites and all households in the second-income quintile (Table 15).

Estimates of natural gas consumption for minority households between 1993 and 1997 showed a decline. During that period, estimates indicated that the largest decline occurred in Hispanic households — a decrease of 10%. Declines in consumption for non-Hispanic White and Black households were 4% and 8%, respectively. At the income-class level, the largest change in natural gas consumption — a decrease of nearly 18% — occurred in the second-income quintile group, with the largest decline occurring in minority households (a decrease of more than 26% and 19% for non-Hispanic Black and Hispanic households, respectively). On the other hand, natural gas consumption in the fourth-income quintile increased overall by 12%; in this same quintile, consumption increased by 12% and 15% for non-Hispanic Whites and Blacks, respectively.

TABLE 9 RECS Natural Gas Consumption, 1993
(million Btu/household per yr)

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	40.76	67.96	40.76	46.59
Quintile 2	51.58	82.54	42.69	53.47
Quintile 3	49.32	46.26	47.75	49.01
Quintile 4	54.40	78.67	48.84	55.41
Quintile 5	69.95	80.29	44.63	68.48
U.S. average	53.91	70.44	44.41	54.59

Source: DOE (1995).

TABLE 10 Difference in Natural Gas Use between Non-Hispanic White and Minority Households, 1993
(million Btu/household per yr)

Income Class	Non-Hispanic Black	Hispanic
Quintile 1	27.20 ^a	0.00
Quintile 2	30.96 ^a	-8.89
Quintile 3	-3.06	-1.57
Quintile 4	24.27 ^a	-5.56
Quintile 5	10.34	-25.32 ^a
U.S. average	16.53 ^a	-9.50 ^a

^a The difference in consumption between groups was statistically significant at the 0.05% level.

Source: DOE (1995).

TABLE 11 Percentage Difference in Natural Gas Use between Non-Hispanic White and Minority Households, 1993

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	66.73	0.00
Quintile 2	60.02	-17.24
Quintile 3	-6.20	-3.18
Quintile 4	44.61	-10.22
Quintile 5	14.78	-36.20
U.S. average	30.66	-17.62

Source: DOE (1995).

TABLE 12 RECS Natural Gas Consumption, 1997 (million Btu/household per yr)

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	38.44	57.97	34.64	42.05
Quintile 2	43.33	60.73	34.43	44.00
Quintile 3	48.37	54.97	42.43	48.58
Quintile 4	61.05	90.87	47.43	61.93
Quintile 5	62.77	77.36	51.29	63.63
U.S. average	51.72	65.06	39.91	52.04

Source: DOE (2000).

TABLE 13 Difference in Natural Gas Use between Non-Hispanic White and Minority Households, 1997 (million Btu/household per yr)

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	19.53 ^a	-3.80
Quintile 2	17.40	-8.90
Quintile 3	6.60	-5.94
Quintile 4	29.82 ^a	-13.62
Quintile 5	14.59	-11.48
U.S. average	13.34 ^a	-11.81 ^a

^a The difference in consumption between groups was statistically significant at the 0.05% level.

Source: DOE (2000).

TABLE 14 Percentage Difference in Natural Gas Use between Non-Hispanic White and Minority Households, 1997

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	50.81	-9.89
Quintile 2	40.16	-20.54
Quintile 3	13.64	-12.28
Quintile 4	48.85	-22.31
Quintile 5	23.24	-18.29
U.S. average	25.79	-22.83

Source: DOE (2000).

**TABLE 15 Change in Natural Gas Consumption, 1993–1997
(million Btu/household per yr)**

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	-2.32	-9.99	-6.12	-4.54
Quintile 2	-8.25 ^a	-21.81	-8.26	-9.47 ^a
Quintile 3	-0.95	8.71	-5.32	-0.43
Quintile 4	6.65	12.20	-1.41	6.52
Quintile 5	-7.18	-2.93	6.66	-4.85
U.S. average	-2.19	-5.38	-4.50	-2.55

^a The change in consumption between 1993 and 1997 was statistically significant at the 0.05% level.

Sources: DOE (1995, 2000).

TABLE 16 Percentage Change in Natural Gas Consumption, 1993–1997

Income Class	Non-Hispanic White (%)	Non-Hispanic Black (%)	Hispanic (%)	All (%)
Quintile 1	-5.7	-14.7	-15.0	-9.7
Quintile 2	-16.0	-26.4	-19.3	-17.7
Quintile 3	-1.9	18.8	-11.1	-0.9
Quintile 4	12.2	15.5	-2.9	11.8
Quintile 5	-10.3	-3.6	14.9	-7.1
U.S. average	-4.1	-7.6	-10.1	-4.7

Sources: DOE (1995, 2000).

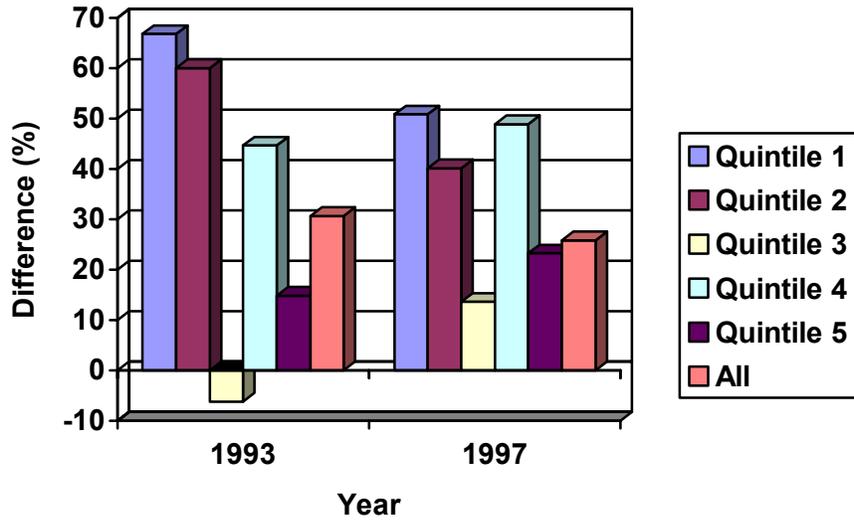


FIGURE 3 Comparative Differences in Natural Gas Consumption for Non-Hispanic White and Non-Hispanic Black Households Decreased between 1993 and 1997

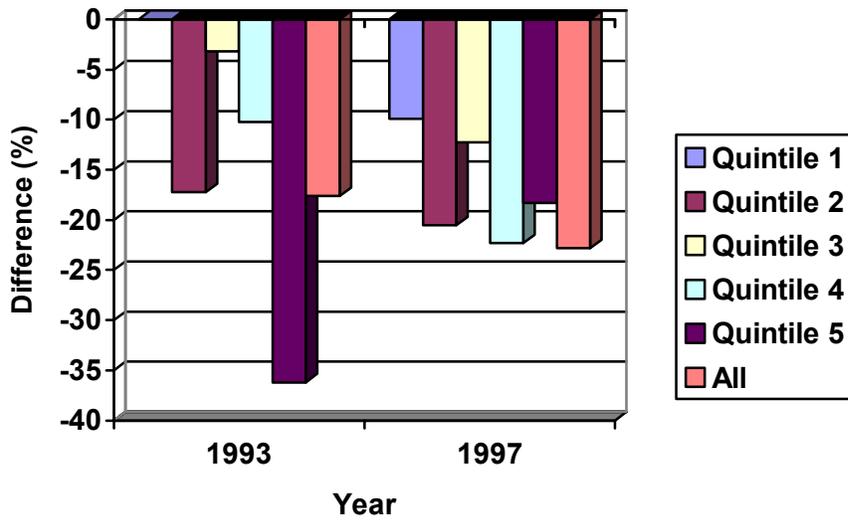


FIGURE 4 Comparative Differences in Natural Gas Consumption for Non-Hispanic White and Hispanic Households Increased between 1993 and 1997

2.3 DISTILLATE FUEL USE

The importance of distillate fuel as a residential energy source has diminished since the late 1970s. Although on a nationwide basis, its use for residential heating has fallen substantially below that of natural gas and electricity, distillate fuel remains an important heating fuel in certain regions. For example, in 1997, distillate fuel was the primary space-heating and water-heating fuel in nearly 37% and 25%, respectively, of all households in New England and the Mid-Atlantic states (DOE 2000). Therefore, factors affecting its availability and price have a disproportionate impact on those regions.

Tables 17 through 24 and Figures 5 and 6 provide data concerning distillate fuel consumption and illustrate the differences and changes in distillate fuel consumption across groups and between surveys. As for electricity and natural gas, the consumption of distillate fuel increased with income; however, the relationship was not a strong one, and it appeared to weaken between 1993 and 1997. A relatively dramatic difference in the level of distillate fuel consumption was noted among the three population groups. In 1993 and 1997, non-Hispanic White households consumed substantially more distillate fuel than did non-Hispanic Blacks and Hispanics.

The difference in household distillate fuel consumption between non-Hispanic White and minority households was statistically significant. In 1993, the average consumption of distillate fuel for non-Hispanic White households was 47% greater than that for non-Hispanic Black households and 22% greater than for Hispanic households (Table 19). While the difference in distillate fuel consumption between non-Hispanic White and Black households declined in 1997, it was still significant. Distillate fuel consumption for non-Hispanic White households was 37% greater than for non-Hispanic Black households (Table 22). For non-Hispanic Whites and Hispanics, the relative difference in distillate fuel consumption increased between 1993 and 1997. The difference in distillate fuel consumption increased for these groups to 36% in 1997 compared with 22% in 1993 (Tables 19 through 22).

Substantial differences among the population groups were noted, both overall and at the income-class level. In 1993, differences in distillate fuel consumption were statistically significant at each income-class level for non-Hispanic White and Black households (Table 18). In all cases, distillate fuel consumption was significantly greater for non-Hispanic White households, ranging from 28% for the fifth-income quintile to 62% for the second-income quintile (Table 19). In 1997, the overall difference in distillate fuel consumption narrowed between non-Hispanic White and Black households but continued to be significant (Figure 5). Furthermore, the pattern of differences across income classes changed. The differences in consumption for the third- and fourth-income quintile groups were no longer statistically significant. In fact, the average distillate fuel consumption for non-Hispanic Black households in the fourth-income quintile was greater than that for non-Hispanic White households (Table 21).³ In 1997, distillate fuel consumption for non-Hispanic Black households ranged from -56% for the fifth-income quintile to 13% for the fourth-income quintile (Table 22).

³ This change is truly a dramatic one, with the relative difference in non-Hispanic White and Black consumption changing from -45% to 13%!

For Hispanic and non-Hispanic White households, the differences in distillate fuel consumption across income class and between the 1993 and the 1997 RECS were also very large. In 1993, along with the overall difference at the group level, the difference in consumption in the second-income quintile was statistically significant (Table 18). With the exception of the fifth-income quintile, Hispanic distillate fuel consumption was less than non-Hispanic White consumption in every income class. The percentage difference was very large and ranged widely, from -55% in the second-income quintile to 10% in the fifth-income quintile (Table 19). In 1997, the differences in distillate fuel consumption increased even more for non-Hispanic White and Hispanic households. Also, a dramatic change was noted in the pattern of differences across income classes (Figure 6). As in 1993, the average distillate fuel consumption for Hispanic households in 1997 was less than that for non-Hispanic White households in every income class, except for the first-income quintile (Table 22). The level of statistical significance in the differences in distillate fuel consumption increased in 1997. The difference in consumption was statistically significant in every income quintile, except for the fourth-income quintile (Table 21). In 1997, the percentage difference ranged from -90% in the third-income quintile to 50% in the lowest-income quintile (Table 22).

Between 1993 and 1997, a small decrease occurred in the overall consumption of distillate fuel. However, the changes across population group and income class varied considerably. For non-Hispanic White and Hispanic households, the consumption of distillate fuel decreased between 1993 and 1997 and was statistically significant for the latter (Table 23). The use of distillate fuel for non-Hispanic White households declined a modest 5.5%, whereas the decline for Hispanics was more than 21%. At the income-class level, a significant decline was noted in Hispanic consumption in four of the five income classes. Consumption increased only in the lowest-income quintile. The decline was statistically significant in three of the five income classes. The increase in the lowest-income quintile group and the decreases in the third- and fifth-income quintile groups were statistically significant. Between 1993 and 1997, the change in distillate fuel consumption for Hispanic households ranged from -87% in the third-income quintile to an increase of 66% in the lowest-income quintile (Table 24).

Changes in distillate fuel consumption for non-Hispanic White households also varied widely at the income-class level, although not as widely as for Hispanics. For non-Hispanic Whites, distillate fuel consumption declined in the second- and fourth-income quintiles, and these decreases were the only statistically significant changes (Table 23). For non-Hispanic White households, the changes ranged from -19% in the second- and fourth-income quintiles to 12% in the third-income quintile (Table 24).

Like non-Hispanic White and Hispanic households, the change in distillate fuel consumption for non-Hispanic Black households was extremely variable among income classes and between the two survey years. Overall distillate fuel consumption increased between 1993 and 1997 but was statistically insignificant. At the income-class level, the changes in consumption for the fourth- and highest-income quintiles were statistically significant. In the fourth-income quintile, average distillate fuel consumption increased, and in the highest-income quintile it decreased (Table 23). The changes in distillate fuel consumption for non-Hispanic Black households ranged from -36% in the highest-income quintile to 67% in the fourth-income quintile (Table 24).

**TABLE 17 RECS Distillate Fuel Consumption, 1993
(million Btu/household per yr)**

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	8.85	5.73	8.47	7.84
Quintile 2	11.80	4.52	5.32	10.14
Quintile 3	12.00	7.40	10.40	11.28
Quintile 4	13.17	7.19	10.84	12.38
Quintile 5	14.38	10.40	15.84	13.95
U.S. average	12.22	6.47	9.58	11.12

Source: DOE (1995).

**TABLE 18 Difference in Distillate Fuel Use between Non-Hispanic White and Minority Households, 1993
(million Btu/household per yr)**

Income Class	Non-Hispanic Black	Hispanic
Quintile 1	-3.12 ^a	-0.38
Quintile 2	-7.28 ^a	-6.48 ^a
Quintile 3	-4.60 ^a	-1.60
Quintile 4	-5.98 ^a	-2.33
Quintile 5	-3.98 ^a	1.46
U.S. average	-5.75 ^a	-2.64 ^a

^a The difference in consumption between groups was statistically significant at the 0.05% level.

Source: DOE (1995).

TABLE 19 Percentage Difference in Distillate Fuel Use between Non-Hispanic White and Minority Households, 1993

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	-35.25	-4.29
Quintile 2	-61.69	-54.92
Quintile 3	-38.33	-13.33
Quintile 4	-45.41	-17.69
Quintile 5	-27.68	10.15
U.S. average	-47.05	-21.60

Source: DOE (1995).

TABLE 20 RECS Distillate Fuel Consumption, 1997 (million Btu/household per yr)

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	9.38	5.91	14.09	8.85
Quintile 2	9.46	4.79	3.06	7.88
Quintile 3	13.50	10.65	1.35	11.86
Quintile 4	10.63	12.01	8.37	10.37
Quintile 5	15.21	6.65	9.49	13.61
U.S. average	11.82	7.44	7.52	10.51

Source: DOE (2000).

TABLE 21 Difference in Distillate Fuel Use between Non-Hispanic White and Minority Households, 1997 (million Btu/household per yr)

Income Class	Non-Hispanic Black	Hispanic
Quintile 1	-3.47 ^a	4.71 ^a
Quintile 2	-4.67 ^a	-6.40 ^a
Quintile 3	-2.85	-12.15 ^a
Quintile 4	1.38	-2.26
Quintile 5	-8.56 ^a	-5.72 ^a
U.S. average	-4.38^a	-4.30^a

^a The difference in consumption between groups was statistically significant at the 0.05% level.

Source: DOE (2000).

TABLE 22 Percentage Difference in Distillate Fuel Use between Non-Hispanic White and Minority Households, 1997

Income Class	Non-Hispanic Black (%)	Hispanic
Quintile 1	-36.99	50.21
Quintile 2	-49.37	-67.65
Quintile 3	-21.11	-90.00
Quintile 4	12.98	-21.26
Quintile 5	-56.28	-37.61
U.S. average	-37.06	-36.38

Source: DOE (2000).

TABLE 23 Change in Distillate Fuel Consumption, 1993–1997 (million Btu/household per yr)

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	0.53	0.18	5.62 ^a	1.01
Quintile 2	-2.34 ^a	0.27	-2.26	-2.26 ^a
Quintile 3	1.50	3.25	-9.05 ^a	0.58
Quintile 4	-2.54 ^a	4.82 ^a	-2.47	-2.01 ^a
Quintile 5	0.83	-3.75 ^a	-6.35 ^a	-0.34
U.S. average	-0.40	0.97	-2.06 ^a	-0.61

^a The change in consumption between 1993 and 1997 was statistically significant at the 0.05% level.

Sources: DOE (1995, 2000).

TABLE 24 Percentage Change in Distillate Fuel Consumption, 1993–1997

Income Class	Non-Hispanic White (%)	Non-Hispanic Black (%)	Hispanic (%)	All (%)
Quintile 1	6.0	3.1	66.4	12.9
Quintile 2	-19.8	6.0	-42.5	-22.3
Quintile 3	12.5	43.9	-87.0	5.1
Quintile 4	-19.3	67.0	-22.8	-16.2
Quintile 5	5.8	-36.1	-40.1	-2.4
U.S. average	-3.3	15.0	-21.5	-5.5

Sources: DOE (1995, 2000).

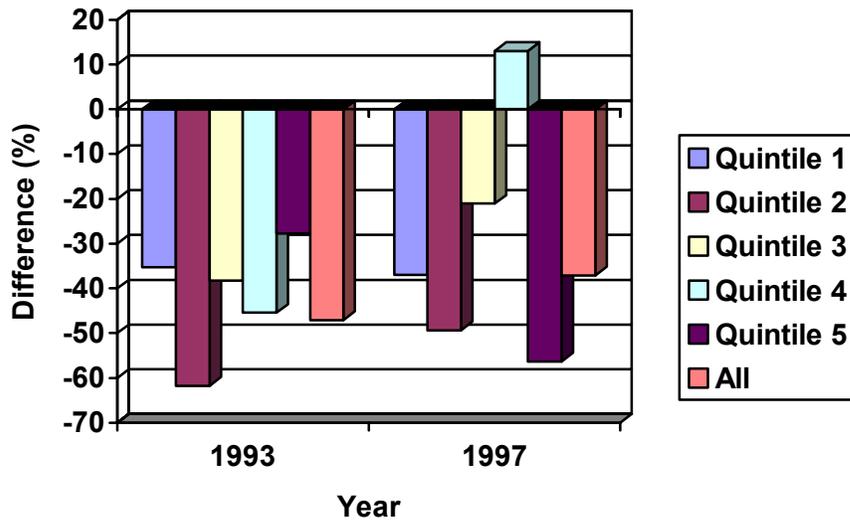


FIGURE 5 Comparative Differences in Distillate Fuel Consumption for Non-Hispanic White and Non-Hispanic Black Households Decreased between 1993 and 1997

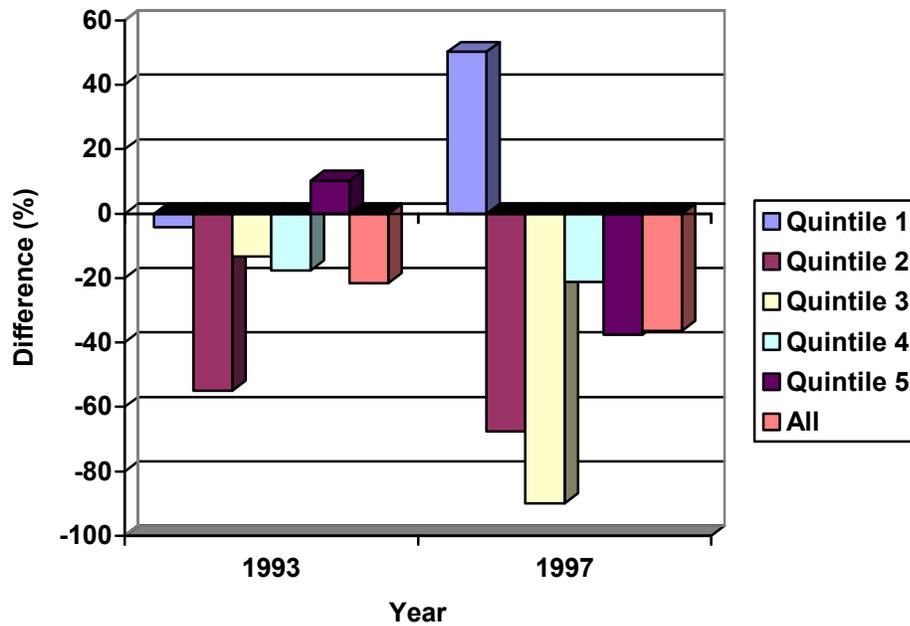


FIGURE 6 Comparative Differences in Distillate Fuel Consumption for Non-Hispanic White and Hispanic Households Increased between 1993 and 1997

2.4 LIQUEFIED PETROLEUM GAS USE

Liquefied petroleum gas is not as heavily used as the other major residential fuels, and it is substantially less important as a residential heating fuel than that of other major residential energy sources; however, it is an important residential energy source in rural areas of the country. Although LPG was the primary space heating fuel in less than 5% of U.S. households in 1997, in rural areas, it was the primary space heating fuel in nearly 20% of all households (DOE 2000). Therefore, factors that affect the availability and price of LPG are likely to have disproportionate impacts on rural communities.

Tables 25 through 32 and Figures 7 and 8 show LPG consumption, and the differences and changes in LPG consumption across groups and between surveys. Unlike the other major residential energy sources, LPG consumption does not have a discernible relationship with income class. In 1993, consumption peaked in the third-income quintile. In 1997, consumption remained relatively flat in the second-, third-, and fourth-income quintile groups, while it fell in the lowest- and highest-income quintile groups. There was a substantial difference in the relative level of LPG consumption among the three population groups. In both 1993 and 1997, LPG consumption for non-Hispanic White households was substantially greater than that for non-Hispanic Black and Hispanic households (Tables 25 and 28).

In addition, statistically significant differences were noted in LPG consumption between non-Hispanic White and minority households. In 1993, the average LPG consumption for non-Hispanic White households was 73% and 69% greater than that for non-Hispanic Black and Hispanic households, respectively (Table 27). The difference in LPG consumption between non-Hispanic White and Black households decreased slightly in 1997; however, the difference was still significant, with non-Hispanic White LPG consumption being 68% greater than non-Hispanic Black consumption (Table 30). In 1997, the relative difference in LPG consumption between non-Hispanic White and Hispanic households was virtually equal to its value in 1993, remaining at 69% (Tables 27 through 30).

While the level of LPG consumption was small, the differences in the relative level of consumption across population groups were large. In 1993, the LPG consumption was the highest in the third-income quintile for each of the population groups. In 1997, LPG consumption within population groups and across income classes was relatively uniform.

The differences in LPG consumption for non-Hispanic White and Black households ranged from 62% in the third-income quintile to 100% in the fifth-income quintile in 1993 (Table 27). In 1997, it ranged from 57% for the third-income quintile to 85% for the second-income quintile (Table 30). In 1997, the overall difference in LPG consumption narrowed slightly between non-Hispanic White and Black households but remained very large (Figure 7). Furthermore, the differences in LPG consumption remained statistically significant in each of the five income quintiles.

For non-Hispanic White and Hispanic households, the differences in LPG consumption across income class and between the 1993 and the 1997 RECS were very large. In 1993, the differences in consumption were statistically significant in every case, as they were for non-Hispanic White and Black households (Table 26). The percentage differences were very large, ranging from 65% in the fourth-income quintile to 74% in the first- and fifth-income quintiles

(Table 27). In 1997, the difference in LPG consumption between non-Hispanic White and Hispanic households was slightly smaller (Figure 8). As in 1993, average LPG consumption for Hispanic households was dramatically less than consumption for non-Hispanic White households in all income classes. As noted, the differences in consumption were statistically significant in all income quintiles (Table 29). In 1997, the percentage difference ranged from 52% in the fourth-income quintile to 82% in the lowest-income quintile (Table 30).

Between 1993 and 1997, although the changes in LPG consumption were generally small, they were statistically significant (e.g., a decrease in the overall consumption of LPG). The changes across population group and income class varied considerably. Between 1993 and 1997, the consumption of LPG decreased for non-Hispanic White and Hispanic households. The decrease in LPG fuel consumption for non-Hispanic White households was statistically significant (Table 31). LPG consumption for non-Hispanic White and Hispanic households declined by 9.7%, and 8.8%, respectively.

At the income-class level, there were large, statistically significant decreases in consumption in Hispanic households in the first- and third-income quintiles. The remaining income quintile groups showed small increases in LPG consumption, but none was statistically significant. Between 1993 and 1997, the change in Hispanic LPG consumption ranged from -46% in the first- and third-income quintiles to 43% in the fourth-income quintile (Table 32).

The changes in LPG consumption for non-Hispanic White households varied widely at the income-class level, although not nearly as much as for Hispanics. LPG consumption for non-Hispanic White households showed similar, statistically significant declines in the first- and third-income quintiles. Changes for non-Hispanic White households ranged from -23% and -25% in the first- and third-income quintiles, respectively, to 8% in the second-income quintile (Table 32).

As for non-Hispanic White and Hispanic households, the change in LPG consumption for non-Hispanic Black households was extremely variable across income classes and between surveys. Unlike non-Hispanic White and Hispanic households, LPG consumption for non-Hispanic Black households increased between 1993 and 1997; however, the increase was not statistically significant. At the income-class level, the changes in consumption for the second- and fifth-income quintiles were statistically significant. In the second-income quintile, average LPG consumption decreased, while it increased in the highest-income quintile (Table 31).⁴ The changes in LPG consumption for non-Hispanic Black households ranged from -55% in the second-income quintile to 29% in the lowest-income quintile (Table 32).

⁴ In 1993, there was no measured consumption of LPG for non-Hispanic Black households in the fifth-income quintile. In general, the estimated LPG and distillate fuel consumption values for minority households at the income class level were probably unreliable because of the very small cell sizes. Much larger samples are probably required if reliable consumption estimates for these fuels are to be generated for these population subgroups.

TABLE 25 RECS Liquefied Petroleum Gas Consumption, 1993 (million Btu/household per yr)

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	5.16	1.12	1.34	3.68
Quintile 2	4.68	1.61	1.47	3.86
Quintile 3	6.21	2.33	2.11	5.41
Quintile 4	4.22	1.29	1.49	3.74
Quintile 5	3.61	0.00	0.95	3.07
U.S. average	4.75	1.28	1.47	3.96

Source: DOE (1995).

TABLE 26 Difference in Liquefied Petroleum Gas Use between Non-Hispanic White and Minority Households, 1993 (million Btu/household per yr)

Income Class	Non-Hispanic Black	Hispanic
Quintile 1	-4.04 ^a	-3.82 ^a
Quintile 2	-3.07 ^a	-3.21 ^a
Quintile 3	-3.88 ^a	-4.10 ^a
Quintile 4	-2.93 ^a	-2.73 ^a
Quintile 5	-3.61 ^a	-2.66 ^a
U.S. average	-3.47 ^a	-3.28 ^a

^a The difference in consumption between groups was statistically significant at the 0.05% level.

Source: DOE (1995).

TABLE 27 Percentage Difference in Liquefied Petroleum Gas Use between Non-Hispanic White and Minority Households, 1993

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	-78.29	-74.03
Quintile 2	-65.60	-68.59
Quintile 3	-62.48	-66.02
Quintile 4	-69.43	-64.69
Quintile 5	-100.00	-73.68
U.S. average	-73.05	-69.05

Source: DOE (1995).

TABLE 28 RECS Liquefied Petroleum Gas Consumption, 1997 (million Btu/household per yr)

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	3.95	1.45	0.73	2.80
Quintile 2	5.04	0.73	1.75	3.86
Quintile 3	4.64	1.99	1.14	3.95
Quintile 4	4.41	1.61	2.13	3.99
Quintile 5	3.45	1.34	0.98	3.13
U.S. average	4.29	1.39	1.34	3.54

Source: DOE (2000).

TABLE 29 Difference in Liquefied Petroleum Gas Use between Non-Hispanic White and Minority Households, 1997 (million Btu/household per yr)

Income Class	Non-Hispanic Black	Hispanic
Quintile 1	-2.50 ^a	-3.22 ^a
Quintile 2	-4.31 ^a	-3.29 ^a
Quintile 3	-2.65 ^a	-3.50 ^a
Quintile 4	-2.80 ^a	-2.28 ^a
Quintile 5	-2.11 ^a	-2.47 ^a
U.S. average	-2.90 ^a	-2.95 ^a

^a The difference in consumption between groups was statistically significant at the 0.05% level.

Source: DOE (2000).

TABLE 30 Percentage Difference in Liquefied Petroleum Gas Use between Non-Hispanic White and Minority Households, 1997

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	-63.29	-81.52
Quintile 2	-85.52	-65.28
Quintile 3	-57.11	-75.43
Quintile 4	-63.49	-51.70
Quintile 5	-61.16	-71.59
U.S. average	-67.60	-68.76

Source: DOE (2000).

TABLE 31 Change in Liquefied Petroleum Gas Consumption, 1993–1997 (million Btu/household per yr)

Income Class	Non-Hispanic White	Non-Hispanic Black	Hispanic	All
Quintile 1	-1.21 ^a	0.33	-0.61 ^a	-0.88 ^a
Quintile 2	0.36	-0.88 ^a	0.28	0.00
Quintile 3	-1.57 ^a	-0.34	-0.97 ^a	-1.46 ^a
Quintile 4	0.19	0.32	0.64	0.25
Quintile 5	-0.16	1.34 ^a	0.03	0.06
U.S. average	-0.46 ^a	0.11	-0.13	-0.42 ^a

^a The change in consumption between 1993 and 1997 was statistically significant at the 0.05% level.

Sources: DOE (1995, 2000).

TABLE 32 Percentage Change in Liquefied Petroleum Gas Consumption, 1993–1997

Income Class	Non-Hispanic White (%)	Non-Hispanic Black (%)	Hispanic (%)	All (%)
Quintile 1	-23.4	29.5	-45.5	-23.9
Quintile 2	7.7	-54.7	19.0	0.0
Quintile 3	-25.3	-14.6	-46.0	-27.0
Quintile 4	4.5	24.8	43.0	6.7
Quintile 5	-4.4	---- ^a	3.2	2.0
U.S. average	-9.7	8.6	-8.8	-10.6

^a Non-Hispanic Black households registered no LPG consumption in the 1993 RECS.

Sources: DOE (1995, 2000).

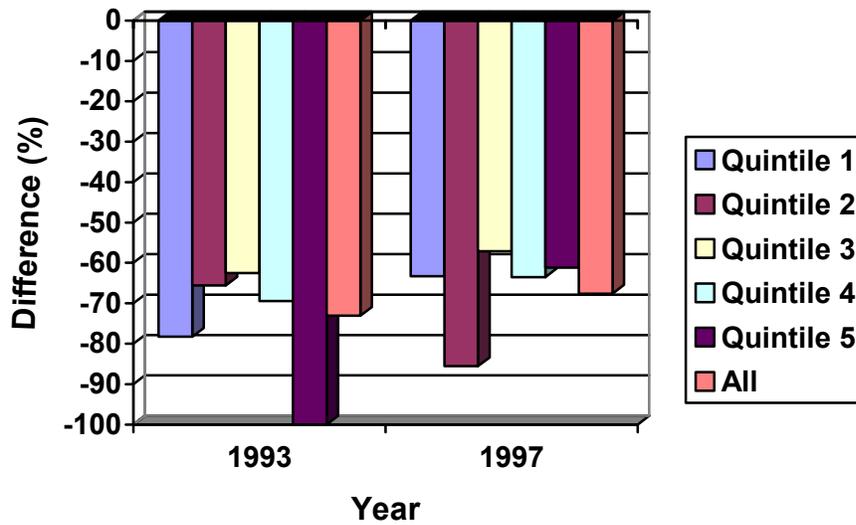


FIGURE 7 Comparative Differences in Liquefied Petroleum Gas Consumption for Non-Hispanic White and Non-Hispanic Black Households Decreased Slightly between 1993 and 1997

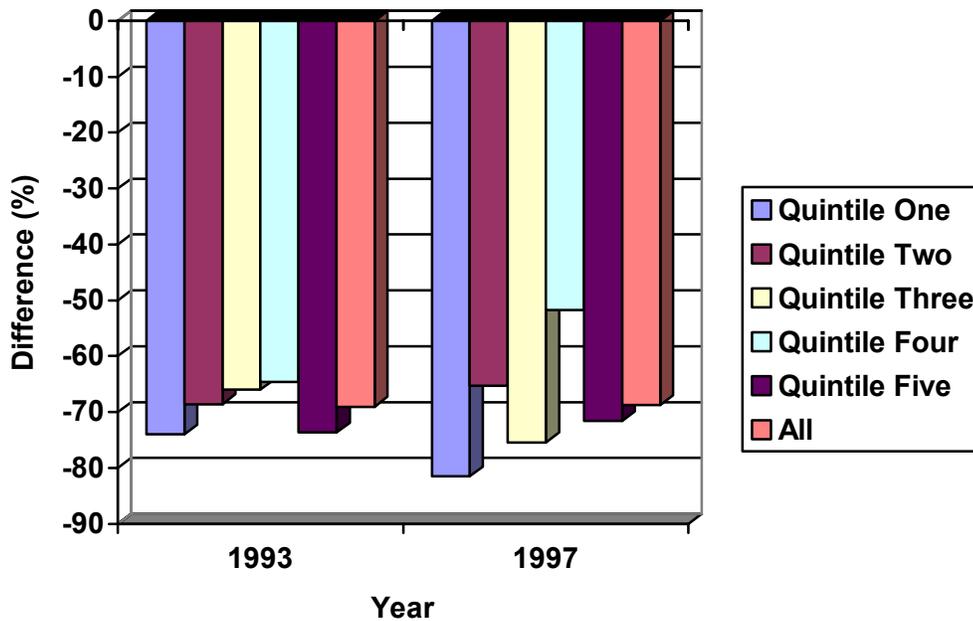


FIGURE 8 Comparative Differences in Liquefied Petroleum Gas Consumption for Non-Hispanic White and Hispanic Households Changed Little between 1993 and 1997

3 ENERGY EXPENDITURES AND POPULATION GROUPS

To assess and compare energy expenditures in 1993 and the 1997, an energy price index was constructed based on energy expenditure data from the 1993 and 1997 RECS. The index is a standard Laspeyres price index; all expenditures are expressed in terms of 1993 dollars (Layard and Walters 1978, pp. 154–156).

Tables 33 through 45 provide energy expenditures, and differences and changes in energy expenditures across groups and between surveys. Tables 33 and 38 show that energy expenditures increased with income class. Nationwide, the highest-income quintile group spends on average 29% more than the lowest-income quintile; however, energy expenditures did not increase in proportion with household income. As a result, the energy expenditure share of income dropped as household income increased.

Overall, average household energy expenditures for non-Hispanic White households were greater than non-Hispanic Black and Hispanic household expenditures in both 1993 and 1997 (Tables 34 and 39). The difference in energy expenditures for Hispanic and non-Hispanic White households was statistically significant at the 0.05% level in both years. The differences in expenditures between non-Hispanic White and Black households were not statistically significant.

The magnitude of the differences between surveys was remarkably similar. In 1993, non-Hispanic Whites spent 5% more on household energy than did non-Hispanic Blacks and 20% more than Hispanics (Table 35). In 1997, the figures were 2% and 20%, respectively (Table 40).

A great deal of variability was noted at the income-class level, and the patterns of energy expenditures changed between periods. For Hispanic households, the total energy expenditures were substantially smaller than for non-Hispanic White households for each income group in 1993 and 1997. In 1993, the differences in expenditures were statistically significant for the second-, third-, and fifth-income quintiles (Table 34), and the percentage difference ranged from –8% in the first-income quintile to –20% in the second-income quintile (Table 35). In 1997, the differences in expenditures were statistically significant for the second- and fourth-income quintiles (Table 39), and the difference ranged from –3% in the first-income quintile to –20% in the second-income quintile (Table 40).

The reasons for differences in energy expenditure for non-Hispanic White and non-Hispanic Black households were different than for non-Hispanic White and Hispanic households. The overall variation in energy expenditures between non-Hispanic White and Black households was primarily driven by differences in the household population income-class distribution. Because of the heavier concentration of non-Hispanic Black households at the lower end of the income distribution, the overall level of energy expenditures was consequently lower for non-Hispanic Black households.

Within income classes, however, the expenditures for non-Hispanic Black households were often greater than those for non-Hispanic White households. In 1993, energy expenditures for non-Hispanic Black households were greater in three of the five income categories. In the first-, second-, and fourth-income quintiles, energy expenditures for non-Hispanic Black households were greater than those for non-Hispanic White households (Table 34). The percentage

difference in expenditures for non-Hispanic White and Black households ranged from -10% for the third-income quintile to 15% for the lowest-income quintile (Table 35). In 1997, energy expenditures for non-Hispanic Black households were greater than those for non-Hispanic White households in four of the five income categories; however, once again, overall, energy expenditures for non-Hispanic White households were greater than those for non-Hispanic Black households. In 1997, the difference in expenditures for non-Hispanic White and Black households ranged from -2% for the fifth-income quintile to 16% for the fourth-income quintile (Table 40).

It is not surprising to find that the changes in energy expenditures were smaller than those seen in energy consumption between 1993 and 1997.⁵ Between 1993 and 1997, none of the changes in energy expenditure — either at the population-group or income-class level — was statistically significant (Table 43). Overall, changes in energy expenditures were minimal, falling by only \$5, which amounted to a 0.4% drop in expenditures between 1993 and 1997 (Table 44).

For non-Hispanic White households, overall energy expenditures increased by \$4 or 0.3% between the two RECSs. The biggest change occurred in the third-income quintile, where expenditures declined 5% between 1993 and 1997. Energy expenditures increased in three of the five income quintiles — the second-, fourth-, and fifth-income quintiles. The highest increase in energy expenditures (3%) for non-Hispanic White households occurred in the fourth-income quintile (Table 44).

The most significant changes in energy expenditure occurred for non-Hispanic Black households; estimates showed that energy expenditures increased by \$40 between 1993 and 1997, or a 3% increase. However, energy expenditures increased by a substantially larger amount in the third- and fourth-income quintiles. In the fourth-income quintile, energy expenditures increased by \$185 (12%) between 1993 and 1997. In the third-income quintile, the increase was \$85 (7%). In addition, however, energy expenditures fell by \$58 per year (5%) for the lowest-income quintile group between 1993 and 1997 (Tables 43 and 44).

Like non-Hispanic White households, Hispanic households experienced essentially no change in energy expenditures between 1993 and 1997. Overall, residential energy expenditures in Hispanic households declined by \$4 (0.4%). At the income-class level, energy expenditures for Hispanic households increased in the lowest- and highest-income quintiles (\$40 and \$110 or 4% and 8%, respectively).

⁵ It is not surprising because total household energy expenditures subsume the trade-offs that occur among residential energy sources and between non-energy-related choices and energy consumption.

4 ENERGY EXPENDITURE SHARE OF HOUSEHOLD INCOME

The energy expenditure burden or the share of income spent on energy is very closely related to income. Tables 36 and 41 show that the energy expenditure share of household income is inversely related to household income. The share of income spent on energy is substantially higher for lower-income households. When comparing the share of income spent on energy, households in the lowest-income quintile spend six to eight times more than do households in the highest-income quintile.

In general, non-Hispanic Black households spend a larger share of their household income on energy. The variation in the share of income spent on energy for non-Hispanic Black and White households is the result of the differences in household population distribution by income class and the share of income spent on energy within income class. Because a larger percentage of non-Hispanic Black households fall in the lower-income quintiles, their overall energy expenditure share is higher. However, the share of income spent on energy by non-Hispanic Blacks was generally higher within income class, especially in the lowest-income quintile group, where the expenditure shares on income were 3% and 4% greater for non-Hispanic Black households than for non-Hispanic White households in 1993 and 1997, respectively.

Overall, the analysis found minor differences in the share of income spent on energy between non-Hispanic White and Hispanic households. At the income-class level, however, Hispanic households spent less income on energy than did non-Hispanic households at each income level in both 1993 and 1997.

Between 1993 and 1997, the energy expenditure share of income fell slightly for non-Hispanic White and Black households and increased slightly for Hispanics. Non-Hispanic White households experienced a decline in energy expenditure share across the board, with energy expenditure shares falling overall and in each income quintile (Table 45).

The changes in energy expenditure shares for non-Hispanic Black and Hispanic households were closely related to changes in income-class composition. For non-Hispanic Black households, the overall energy expenditure share of income decreased slightly between 1993 and 1997, although expenditure shares increased in each income class, except for the second-income quintile. The net decrease for non-Hispanic Black expenditure shares was determined by the dramatic increase in the percentage of non-Hispanic Black households in the highest-income quintile between 1993 and 1997. For Hispanics, the overall energy expenditure share of income increased slightly between 1993 and 1997, although expenditure shares fell for this group in each income class. The net increase in Hispanic expenditure shares was determined by the dramatic increase in the percentage of Hispanic households in the lowest-income quintile between 1993 and 1997.

**TABLE 33 RECS Total Energy Expenditures, 1993
(1993\$/household per yr)**

Income Class	Non-Hispanic White (\$)	Non-Hispanic Black (\$)	Hispanic (\$)	All (\$)
Quintile 1	980	1,123	905	999
Quintile 2	1,148	1,239	919	1,125
Quintile 3	1,303	1,172	1,070	1,271
Quintile 4	1,401	1,495	1,234	1,395
Quintile 5	1,673	1,613	1,355	1,632
U.S. average	1,322	1,256	1,064	1,284

Source: DOE (1995).

**TABLE 34 Difference in Total Energy Expenditures between Non-Hispanic White and Minority Households, 1993
(1993\$/household per yr)**

Income Class	Non-Hispanic Black (\$)	Hispanic (\$)
Quintile 1	143	-75
Quintile 2	91	-229 ^a
Quintile 3	-131	-233 ^a
Quintile 4	94	-167
Quintile 5	-60	-318 ^a
U.S. average	-66	-258 ^a

^a The difference in consumption between groups is statistically significant at the 0.05% level.

Source: DOE (1995).

TABLE 35 Percentage Difference in Total Energy Expenditures between Non-Hispanic White and Minority Households, 1993

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	14.59	-7.65
Quintile 2	7.93	-19.95
Quintile 3	-10.05	-17.88
Quintile 4	6.71	-11.92
Quintile 5	-3.59	-19.01
U.S. average	-4.99	-19.52

Source: DOE (1995).

TABLE 36 Energy Expenditure Share of Household Income, 1993

Income Class	Non-Hispanic White (%)	Non-Hispanic Black (%)	Hispanic (%)	All (%)
Quintile 1	12.78	16.00	11.88	13.28
Quintile 2	6.76	7.53	5.73	6.69
Quintile 3	4.67	4.32	3.91	4.57
Quintile 4	3.16	3.37	2.86	3.15
Quintile 5	2.00	1.97	1.78	1.96
U.S. average	3.48	4.94	3.54	3.57

Source: DOE (1995).

TABLE 37 Percentage Difference in Energy Expenditure Shares between Non-Hispanic White and Minority Households, 1993

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	3.22	-0.90
Quintile 2	0.77	-1.03
Quintile 3	-0.35	-0.76
Quintile 4	0.21	-0.30
Quintile 5	-0.04	-0.22
U.S. average	1.47	0.07

Source: DOE (1995).

TABLE 38 RECS Total Energy Expenditures, 1997 (1993\$/household per yr)

Income Class	Non-Hispanic White (\$)	Non-Hispanic Black (\$)	Hispanic (\$)	All (\$)
Quintile 1	979	1,065	946	981
Quintile 2	1,155	1,222	925	1,118
Quintile 3	1,237	1,257	1,064	1,208
Quintile 4	1,450	1,680	1,208	1,437
Quintile 5	1,691	1,657	1,465	1,656
U.S. average	1,326	1,296	1,060	1,279

Source: DOE (2000).

TABLE 39 Difference in Total Energy Expenditures between Non-Hispanic White and Minority Households, 1997 (1993\$/household per yr)

Income Class	Non-Hispanic Black (\$)	Hispanic (\$)
Quintile 1	85	-34
Quintile 2	67	-230 ^a
Quintile 3	20	-172
Quintile 4	230	-242 ^a
Quintile 5	-34	-227
U.S. average	-30	-266 ^a

^a The difference in consumption between groups is statistically significant at the 0.05% level.

Source: DOE (2000).

TABLE 40 Percentage Difference in Total Energy Expenditures between Non-Hispanic White and Minority Households, 1997

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	8.72	-3.43
Quintile 2	5.79	-19.95
Quintile 3	1.64	-13.94
Quintile 4	15.88	-16.66
Quintile 5	-2.04	-13.40
U.S. average	-2.24	-20.08

Source: DOE (2000).

TABLE 41 Energy Expenditure Share of Household Income, 1997

Income Class	Non-Hispanic White (%)	Non-Hispanic Black (%)	Hispanic (%)	All (%)
Quintile 1	11.66	16.04	11.46	12.32
Quintile 2	6.54	7.13	5.47	6.44
Quintile 3	4.31	4.33	3.63	4.22
Quintile 4	2.94	3.38	2.52	2.91
Quintile 5	1.93	2.19	1.70	1.91
U.S. average	3.24	4.66	3.59	3.37

Source: DOE (2000).

TABLE 42 Percentage Difference in Energy Expenditure Shares between Non-Hispanic White and Minority Households, 1997

Income Class	Non-Hispanic Black (%)	Hispanic (%)
Quintile 1	4.38	-0.20
Quintile 2	0.60	-1.06
Quintile 3	0.02	-0.67
Quintile 4	0.44	-0.41
Quintile 5	0.27	-0.23
U.S. average	1.42	0.35

Source: DOE (2000).

TABLE 43 Change in Total Energy Expenditures between Non-Hispanic White and Minority Households 1993–1997^a (1993\$/household per yr)

Income Class	Non-Hispanic White (\$)	Non-Hispanic Black (\$)	Hispanic (\$)	All (\$)
Quintile 1	-0.76	-58.36	40.67	-17.51
Quintile 2	7.32	-16.74	5.83	-7.22
Quintile 3	-66.20	85.03	-5.61	-62.98
Quintile 4	48.83	185.13	-25.76	41.67
Quintile 5	18.36	43.87	109.69	24.19
U.S. average	4.11	40.46	-4.23	-4.99

^a The change in energy expenditures between 1993 and 1997 was statistically insignificant at the 0.05% level in all cases.

Sources: DOE (1995, 2000).

TABLE 44 Percentage Change in Total Energy Expenditures, 1993–1997

Income Class	Non-Hispanic White (%)	Non-Hispanic Black (%)	Hispanic (%)	All (%)
Quintile 1	-0.08	-5.20	4.49	-1.75
Quintile 2	0.64	-1.35	0.63	-0.64
Quintile 3	-5.08	7.26	-0.52	-4.95
Quintile 4	3.49	12.38	-2.09	2.99
Quintile 5	1.10	2.72	8.10	1.48
U.S. average	0.31	3.22	-0.40	-0.39

Sources: DOE (1995, 2000).

TABLE 45 Percentage Change in Energy Expenditure Share of Income, 1993-1997

Income Class	Non-Hispanic White (%)	Non-Hispanic Black (%)	Hispanic (%)	All (%)
Quintile 1	-1.12	0.04	-0.42	-0.96
Quintile 2	-0.23	-0.40	-0.26	-0.25
Quintile 3	-0.36	0.01	-0.27	-0.35
Quintile 4	-0.22	0.01	-0.34	-0.24
Quintile 5	-0.07	0.23	-0.08	-0.05
U.S. average	-0.23	-0.28	0.05	-0.20

Sources: DOE (1995, 2000).

5 CONCLUSIONS

The most significant finding of this analysis was that the differences in the composition of energy use among population categories persisted in both the 1993 and the 1997 RECS. In most cases, however, those differences narrowed between surveys, both at the overall group level and at the income-class level.

In addition, no substantial changes were evident in the overall consumption of energy and the expenditure levels between 1993 and 1997. Although not statistically significant for the most part, the data indicated a small increase in average household electricity consumption and small decreases in the consumption of other major residential energy sources — natural gas, distillate fuel, and LPG.⁶

Between 1993 and 1997, the change in energy consumption by residential energy source was statistically significant only for LPG. For the other energy sources, the changes were not statistically significant.

Non-Hispanic White households consumed the most electricity of the groups considered in the study. The overall difference with non-Hispanic Black households was statistically significant in both surveys, but this difference tended to disappear when controls were put in place for income class. Furthermore, the data indicated that the differences in electricity between non-Hispanic White and non-Hispanic Black households declined between 1993 and 1997.

For Hispanic households, in addition to statistically significant differences at the group level, statistically significant differences were also observed at the income-class level. In the 1993 survey for households falling within the three lowest-income quintile classes, average Hispanic household electricity consumption was significantly lower than that for non-Hispanic White households. In the 1997 survey, the differences at the income-class level were no longer statistically significant; however, the estimated consumption of electricity for non-Hispanic White households was still greater at each income-class level and continued to remain statistically significant at the group level.

The major difference in consumption among the three population groups was in the use of hydrocarbon-based energy sources — natural gas, distillate fuel, and LPG. At the population-group level, the consumption of natural gas by non-Hispanic Black households was significantly greater than that by non-Hispanic White and Hispanic households; however, the consumption of distillate fuel and LPG by non-Hispanic White households was significantly greater than that by non-Hispanic Black and Hispanic households — as was the consumption of natural gas by non-Hispanic Whites compared with that by Hispanics. These differences prevailed over both survey periods, with a slight reduction in the 1997 RECS.

Moreover, these differences tended to persist at the income-class level. The consumption of natural gas by non-Hispanic Black households was in many cases significantly greater than that by non-Hispanic White households over both surveys. In the 1993 and 1997 surveys, natural gas consumption by non-Hispanic Blacks was significantly greater than that by non-Hispanic Whites

⁶ The estimated fall in LPG consumption is statistically significant.

in the lowest- and fourth-income quintiles. Consumption of distillate fuel for non-Hispanic White households was significantly greater than that for non-Hispanic Black households for each income class in the 1993 survey, whereas it was significantly greater in the first-, second-, and fifth-income quintiles in the 1997 survey. Non-Hispanic White household consumption of distillate fuel was also significantly greater than that for Hispanic consumption in a number of income-quintile cases, and the number increased between surveys. In the 1993 survey, non-Hispanic White household consumption was significantly greater for only the second-income quintile, whereas in the 1997 survey, it was insignificant for only the fourth-income quintile. In both surveys and for each income quintile, non-Hispanic White household consumption of LPG was significantly greater than that for non-Hispanic Black and Hispanic households.

Real household energy expenditures were remarkably stable between survey periods; however, the level of real household energy expenditures differed across population groups. Energy expenditures for Hispanic households were significantly smaller than that for non-Hispanic White households in both surveys. Differences were also found at the income-class level. For non-Hispanic Black and White households, the differences in energy expenditures were statistically insignificant.

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