Energy Consumption and Expenditures by Low-Income Customers

Available federal data indicates that low-income households consume less energy than non-low-income households. The inescapable policy conclusion is that proposals to move a greater proportion of utility bills to fixed monthly charges are regressive in nature.

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As electric utilities enter a period of increased price volatility, one industry response has involved an effort to increase the proportion of revenue collected through fixed charges. Common forms these proposals have taken include an increased fixed monthly customer charge, as well as a set "minimum bill" which includes the customer charge plus a set amount of usage.

One question posed by these proposals to institute higher fixed bills is the extent to which, if at all, increasing fixed charges at lower consumption levels is regressive in nature. If low-income customers have below-average energy consumption, increasing the use of minimum bills, as well as moving increased fixed charges to initial rate blocks, would disproportionately harm low-income customers. Given the inability-to-pay of many low-income customers, implementing regressive fixed charges will likely meet stiff public resistance, as well as close regulatory scrutiny. To help address this question, this article outlines available federal data that documents the relationship between income and energy consumption.

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I. Low-Income Home Energy Assistance Program (LIHEAP)

Each year, the Division of Energy Assistance within the Office of Community Services of the U.S. Department of Health and Human Services (HHS) prepares a "LIHEAP Home Energy Notebook" to assist state LIHEAP offices in delivering federal fuel assistance benefits. The federal fuel assistance program is known as the Low-Income Home Energy Assistance Program (LIHEAP). The LIHEAP Home Energy Notebook for Fiscal Year 1999, issued in July 2001, is the most recent such publication. The LIHEAP notebook presents national as well as regional data.

According to the LIHEAP report, low-income households use considerably less energy for home heating than do their non-low-income counterparts (**Table 1**). For households heating with electricity, the national data demonstrates that low-income households consume 11.8 million Btu compared to a 14.8 mBtu consumption by non-low-income households. Indeed, the HHS data reports that not only do low-income households use less than their higher-income counterparts, but that low-income households use less than average residential consumption. Not surprisingly, the only region where the consumption is even close is in the South, where the hot climate spurs heavy air conditioning use.

Similar patterns exist, too, for home cooling. According to the LIHEAP report, not only do fewer low-income households cool their homes, but low-income households that do cool their homes consume substantially less energy

Table 1: Home Heating Consumption and Expenditures per Household

	Consumption (mmBtu)			Expenditures ($)		
	All Fuels	Natural Gas	Electricity	All Fuels	Natural Gas	Electricity
United States						
All households	49.0	64.7	13.7	364	413	263
Non-low-income	52.8	67.8	14.8	389	430	281
Low-income	41.6	58.0	11.8	314	374	231
Northeast						
All households	72.1	77.8	17.7	554	638	478
Non-low-income	78.1	79.3	20.2	599	651	524
Low-income	59.7	74.3	13.6	461	609	404
Midwest						
All households	74.3	84.5	21.1	450	472	372
Non-low-income	76.2	85.4	25.3	462	478	426
Low-income	69.7	82.2	14.1	424	456	283
South						
All households	29.0	48.3	12.2	273	333	226
Non-low-income	30.1	51.2	12.4	285	351	234
Low-income	26.9	42.9	11.7	249	300	209
West						
All households	33.2	45.2	13.5	245	252	243
Non-low-income	38.2	50.2	15.6	271	275	271
Low-income	24.7	34.7	10.7	201	204	203

Source: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Community Services, Division of Energy Assistance, LIHEAP Home Energy Notebook for Fiscal Year 1999, at Table A-4 and A-5a (July 2001).

for cooling than do their non-low-income counterparts. This is true nationwide as well as for each region of the country. For purposes of this analysis, "cooling" includes central and room air-conditioning as well as non-air-conditioning cooling devices such as ceiling fans.

Household expenditures follow the same pattern as household consumption. While low-income households heating with electricity in the South spend only 10.7 percent less than do non-low-income households, low-income households heating with electricity in the Midwest spend 33.6 percent less and low-income households heating with electricity in the West spend 25.1 percent less (**Table 2**).

The pattern which exists for electric heating is not unique. The same pattern exists for natural gas heating, as well as for "all fuels." HHS reports, for example, that low-income Midwest households which use natural gas as their primary heating source have average annual home heating expenditures of $456. In contrast, non-low-income households have average annual home heating expenditures of $478. Average home heating expenditures for the total population are $472. In all regions of the country, as well as the country as a whole, low-income heating expenditures (and consumption) are lower than those of average households.

Table 3: Home Energy Expenditures for All Fuels, Non-Low-Income and Low-Income

	Expenditures ($)		
	All Fuels	Natural Gas	Electricity
United States			
All households	1,254	1,299	1,131
Non-low-income	1,352	1,383	1,222
Low-income	1,061	1,116	964
Northeast			
All households	1,503	1,564	1,341
Non-low-income	1,638	1,641	1,466
Low-income	1,223	1,383	1,137
Midwest			
All households	1,286	1,310	1,079
Non-low-income	1,354	1,373	1,192
Low-income	1,125	1,151	893
South			
All households	1,265	1,369	1,205
Non-low-income	1,361	1,489	1,282
Low-income	1,082	1,148	1,039
West			
All households	976	1,018	900
Non-low-income	1,055	1,094	975
Low-income	842	858	798

Source: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Community Services, Division of Energy Assistance, LIHEAP Home Energy Notebook for Fiscal Year 1999, at Table A-2a (July 2001).

Home heating, of course, is not the only use of energy. Non-heating electricity usage and expenditures appear in the "home energy" consumption and expenditures data compiled by LIHEAP (**Table 3**). When electric non-heating is added to household energy consumption and expenditures, low-income households still evidence lower consumption. LIHEAP reports, for example, that low-income Midwest households using natural gas as their primary heating fuel have average annual *total* home

Table 2: Dollar and Percentage Difference between Low-Income and Non-Low-Income Electric Heating Usage and Expenditures

	Non-Low-Income Households ($)	Low-Income Households ($)	Dollar Difference ($)	Percentage Difference (Percent)
National	281	231	50	17.8
Northeast	524	404	120	22.9
Midwest	426	283	143	33.6
South	234	209	25	10.7
West	271	203	68	25.1

Source: Calculated from data of Table 1.

energy expenditures (including electricity) of $1,151, while non-low-income households have average annual expenditures of $1,373, a difference of 16.2 percent. Home energy expenditures for the average household are $1,310. Again, the relationship holds for all fuels as well as for all regions of the country. Clearly, low-income households have total home energy expenditures that are not only "below average," but that are considerably below what non-low-income households experience.

II. Consumer Expenditures Survey (U.S. Department of Labor)

The U.S. Department of Labor's Bureau of Labor Statistics publishes an annual Consumer Expenditures Survey.[1] This analysis is based on actual data provided by households participating in the survey. The Consumer Expenditures Survey presents national as well as regional data. It also presents data for selected metropolitan areas. The survey provides electricity expenditures as well as natural gas expenditures. It does not provide consumption data.

The Labor Department reports that there is a direct relationship between income and natural gas expenditures. While Northeast households with incomes of less than $5,000 have electric expenditures of $449, households with incomes of $20,000 to $30,000 have expenditures of $724, and households with income over $70,000 have electric expenditures of $1,168.

Table 4 presents regional information from the most recent 2-year period, 1999–2000, to illustrate the results. Similar results appertain to each prior 2-year period as well. The data shows that while the magnitude of the difference is greater for electric expenditures than for natural gas expenditures, natural gas expenditures follow the same pattern. **Figure 1**, which presents the same information in graphical form, demonstrates that each level of higher income reports higher electricity expenditures.

III. Residential Energy Consumption Survey (RECS)

A final source of information is the U.S. Department of Energy's 1997 RECS. DOE reports that, holding all else equal, low-income households that use electricity for space heating have a higher "heating intensity" than do households with higher incomes, all other things equal. Heating intensity is measured as usage per thousand square feet per heating degree-day (HDD).

DOE, however, found that factors between income levels were *not* equal. The 1997 RECS results document that while the average household heating with electricity

Table 4: Average Annual Expenditures ($) and Characteristics, 1999–2000

	Natural Gas				Electricity			
	Northeast	Midwest	South	West	Northeast	Midwest	South	West
<$5,000	159	192	107	149	449	425	705	368
$5,000–$9,999	223	259	116	121	441	583	774	415
$10,000–$14,999	300	314	127	177	590	663	927	581
$15,000–$19,999	381	333	148	214	680	698	1,000	619
$20,000–$29,999	370	352	146	210	724	802	1,072	630
$30,000–$39,999	399	351	151	244	770	802	1,109	697
$40,000–$49,999	367	406	181	262	834	857	1,168	747
$50,000–$69,999	421	447	198	318	950	938	1,295	813
$70,000 and over	528	568	279	395	1,168	1,075	1,480	987
Total households	385	391	171	259	812	821	1,109	713

Source: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditures Survey, available at http://www.bls.gov/cex/csxcross.htm (region of residence by income before taxes). Scroll to the 2-year desired; multiple 2-year periods are provided.

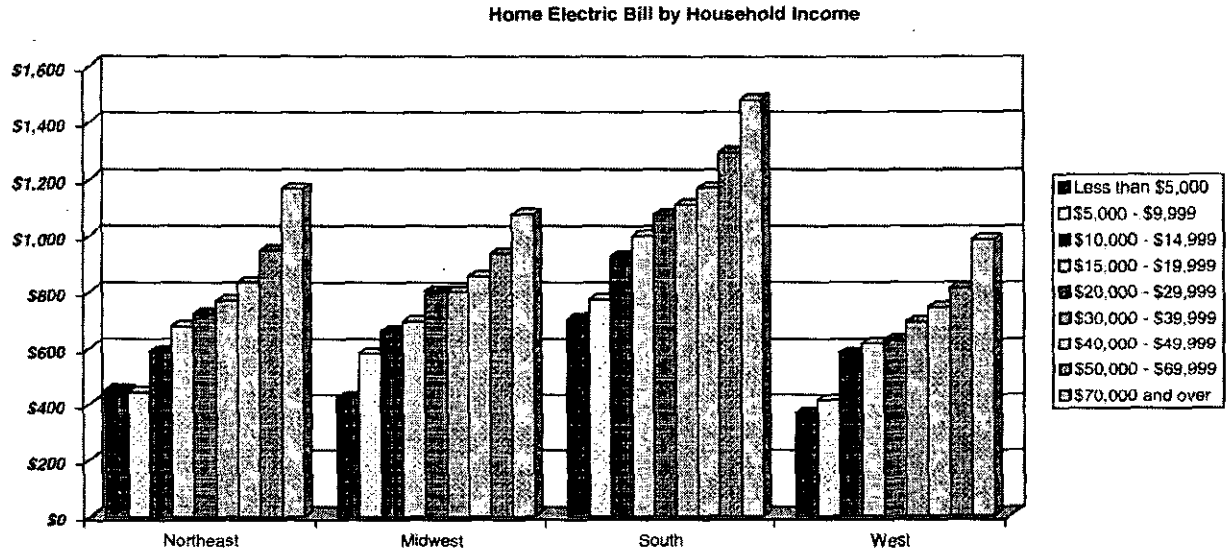

Figure 1: Average Annual Expenditures and Characteristics, Electricity, 1999–2000

has a space heating intensity (kWh/thousand square feet per degree-day) of 0.794, households with incomes below the poverty level have a space heating intensity of 0.923. Households with incomes less than $10,000 have a space heating intensity of 0.910. A higher number means that there is greater consumption per thousand square feet per heating degree-day.[2]

If one were to stop at this point, the conclusion would clearly be that, all else being equal, low-income households use more energy than households on average. However, DOE goes on to find that while households heating with electricity on average have 1,468 square feet of heating floor space, households heating with electricity with incomes below the poverty line have only 1,080 of heated floor space. Households with incomes below $10,000 have only 981 square feet of heated floor space. As a result, while total electric space heating consumption is 12.8 mmBtu for the average household, total electric space heating consumption is only 11.4 mmBtu for the household living below the poverty level and only 10.4 mmBtu for the household with income below $10,000.

As found by other agencies doing similar research, natural gas consumption follows the same pattern as electric consumption.

DOE also found that total space heating consumption for households using electricity steadily

Table 5: Space Heating Usage and Space Heating Intensity by Income

	Electricity as Primary Space Heating Fuel			Natural Gas as Primary Space Heating Fuel		
	Space Heating Use[a]	Space Heating Intensity[b]	Htd Square Footage	Space Heating Use[a]	Space Heating Intensity[b]	Htd Square Footage
<$10,000	10.4	0.910	981	56.6	11.242	1,152
$10,000–$24,999	11.9	0.907	1,226	61.5	9.758	1,363
$25,000–$49,999	13.0	0.802	1,468	67.4	7.610	1,750
$50,000 or more	15.2	0.678	2,037	75.5	6.406	2,366
Below poverty	11.4	0.923	1,080	55.3	10.564	1,208
Total households	12.8	0.794	1,468	66.9	7.876	1,757

Source: Energy Information Administration, U.S. Department of Energy (Nov. 1999). A Look at Residential Energy Consumption in 1997, at Table CE2–3c.

[a] Space heating use in mmBtu.

[b] Heating intensity in kWh for electricity and cubic feet for natural gas.

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Table 6: Total Household Energy Consumption in Physical Unit of Total Consumption per Household

	Total Energy		Electricity		Hot Water	
	Electricity[a]	Natural Gas[b]	Refrigerator	Lights & Appliances	Electricity	Natural Gas
Less than $10,000	7,372	65	1,114	3,461	2,233	20
$10,000–$24,999	8,926	75	1,198	4,462	2,657	21
$25,000–$49,999	10,173	85	1,279	5,511	2,953	24
$50,000 and more	12,974	98	1,603	7,219	3,430	27
Below Poverty	8,229	68	1,123	4,139	2,824	24
Total households	10,219	83	1,323	5,412	2,871	24

Source: Energy Information Administration, U.S. Department of Energy (Nov. 1999). A Look at Residential Energy Consumption in 1997, at 115, 184, 208.
[a] Electricity presented in kWh.
[b] Natural gas presented in thousand cubic feet (mcf).

Table 7: Total Household Energy Consumption in U.S. Households by Household Income (1997)

Income	Space Heating	Electricity (A/Cg)	Hot Water	Refrigerator	Lights & Appliances
<$10,000	40.4	4.6	15.8	3.8	15.4
$10,000–$24,999	45.9	5.0	16.6	4.1	18.4
$25,000–$49,999	53.4	5.1	19.1	4.4	22.7
$50,000 and more	62.0	7.3	23.1	5.5	29.6
Below poverty	41.3	4.9	18.8	3.8	18.5
All households	52.0	5.7	19.0	4.5	22.4

Source: Energy Information Administration, U.S. Department of Energy (Nov. 1999). A Look at Residential Energy Consumption in 1997, at 115.

increases as income increases. While households with incomes below the poverty line have 1,080 square feet of heated floor space, households with incomes of $50,000 or more have 2,037 square feet of heated floor space (**Table 5**).

These findings are not limited to space heating. The RECS goes on to report that low-income energy consumption (and expenditures) is less than that of the average household (and certainly less than non-low-income households) not just for space heating, but for total energy use, as well as for each end use. Total electric consumption for households with income below $10,000 is 7,372 kWh, for example, while average household electric consumption is 10,219 kWh (**Table 6**).

The relationship between household income and energy consumption holds for each energy end use (**Table 7**). This includes space heating, electric air conditioning, domestic hot water, refrigeration, and electric lights and appliances.

IV. Summary

The available federal data, on a national and regional basis, supports the conclusion that low-income households consume less energy (whether heating energy or total household energy) than do households on average, and certainly less than non-low-income households. As a result, it is necessary to find that proposals to move a greater proportion of utility bills to fixed monthly charges are regressive in nature and will tend to impose adverse impacts on low-income consumers.■

Endnotes:

1. U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditures Survey, available at http://www.bls.gov/cex/csxcross.htm (region of residence by income before taxes).

2. Poverty level is a way to measure the low-income status of a household, taking into account household size. Poverty levels are updated annually. For 1997, the year the RECS data was gathered, the poverty level was set at $7,890 for a household size of one, and $2,720 higher for each additional household member (so that, for example, the poverty line for a household of four people came to $16,050). The source for the 1997 data is 62 Federal Register 10856 (Mar. 10, 1997).