ENERGY USE AND THE POOR:

THE ASSOCIATION OF CONSUMPTION WITH INCOME

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Despite the concerns that low-income advocates have regarding the availability of low-income conservation and weatherization programs, it is important to remember that, on average, low-income households have lesser energy consumption than their middle and upper income counterparts.

This observation may well seem counterintuitive. The image of low-income households living in old and dilapidated housing is strong. Rounding out that picture are images of inefficient heating systems as well as dwelling units with little or no insulation or other energy savings features. While this picture of the low-income dwelling may be accurate, it does not ipso facto follow that the low-income population has higher than average consumption. Indeed, notwithstanding the accuracy of the image, the opposite is true.\1\

The purpose of this memo is to review the available data on energy consumption as a function of income. The memo will further seek explanation of why low-income consumption might be lower than that of higher income households despite the relatively poorer and more inefficient housing stock in which low-income households live.

\1\ This merely lends credence to the observation that low use can nevertheless involve wasteful usage. This memo, however, shall for the moment set aside the implications of this result for purposes of assessing demand side management (DSM) measures.

I. THE ASSOCIATION BETWEEN CONSUMPTION AND INCOME.

Household energy consumption decreases as household income decreases. This observation holds true for the nation as a whole, for each region of the nation, and for nearly every state in the nation. Moreover, this observation has held consistent over time.

Lower-incomes are associated with lower energy use for the United States as a whole. According to a 1990 study by the Energy Information Administration of the U.S. Department of Energy (DOE),\2\ total energy use for low-income households can be as much as 20 percent lower than the total population average. Moreover, DOE reports, this conclusion holds for a range of fuel sources used for heating, including natural gas, oil and electricity. For each of these fuels, alone, as well as for total energy consumption, energy use goes up as income goes up:

\2\ U.S. Department of Energy, Energy Information Administration, ***Consumption and Expenditures 1987, Part I: National Data*** (January 1990).

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INCOME	TOTAL ENERGY	NATURAL GAS	OIL	ELECTRICITY
All households:	$1,080	$1,073	$1,260	
<$10,000:	$ 859	$ 868	$ 985	
$10,000-$19,999:	$ 944	$ 933	$1,170	
$20,000-$34,999:	$1,072	$1,057	$1,196	
$35000+:	$1,347	$1,330	$1,662	

This DOE data is consistent with other studies of the same issue. For example, a study released by the National Council of Senior Citizens (NCSC) found that, nationally, energy consumption by low-income elderly households is less than 84 percent of the average consumption for the elderly population as a whole.\3\

	HEAT WITH OIL	HEAT W/ GAS/ELEC.
NON-POOR:	$1,185	$1,033
POOR:	$1,083	$ 871

The Washington Center for Metropolitan Studies (WCMS) found similar results, not taking into consideration age.\4\ Low-income households in 1975, WCMS found, had annual electric use 55 percent less than all households (60.6 MBTU

\3\ ***Double Jeopardy: The Impact of Energy Taxes on Low-Income Households***, National Council of Senior Citizens (1988).

\4\ ***Colder--Darker***, Washington Center for Metropolitan Studies (1977).

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vs. 94.2 MBTU) and paid 48 percent less per year ($188 vs. $278).[5]
Low-income natural gas customers used 24 percent less than all households (109.8 MBTU vs. 136.3 MBTU) and paid 23 percent less ($182 vs. $224).[6]
For natural gas customers, the comparison between income ranges[7] was even more stark. The WCMS found the following natural gas usage patterns:

Income:	<$14,000	$14000-$20,500	$25,000+
Avg. ann. MBTU:	110.1	137.4	190.5
Avg. ann cost:	$182.70	$228.30	$328.00
Avg. price/MBTU:	$ 1.66	$ 1.66	$ 1.72

The Syracuse Research Corporation relied on WCMS work to report the following electric usage characteristics:[8]

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[5] In a study of its low-income customers in the Connecticut Light and Power service territory, Northeast Utilities (CL&P's parent company) found that: "the overall mean annual energy consumption level (kWh) is lower for the low-income respondents (5,525 kWh) than for the respondents in other income groups (8,624 kWh). Forty-one percent of the low-income respondents use less than 4,000 kWh per year, while only 16 percent of the respondents in other income groups use less than 4,000 kWh per year.* * *the relationship continues for the monthly comparisons. The low-income households consume about one-third less electricity monthly when compared to the typical CL&P responding household." Northeast Utilities, ***A Preliminary Analysis of Low-Income Households in the CL&P Service Territory***, at 21 - 22 (1983).

[6] The U.S. Department of Energy, Economic Regulatory Administration, Office of Petroleum Operations, relied upon, and quoted, these figures in its report ***Low-Income Energy Assistance Programs: A Profile of Need and Policy Options*** (July 1980).

[7] This contrasts to the comparison between the poor and the total population average.

[8] Syracuse Research Corporation, ***Low-Income Families and High Energy Costs: An Economic Study*** (1978).

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INCOME	Low-income	$14,000-$20,500	$25,000+
ELECTRICITY	60.6 MBTU	111.3 MBTU	137.5 MBTU

These national figures are supported by a variety of local studies. A Philadelphia study, based on the 1985 American Housing Survey, found as follows:\9\

MONTHLY INCOME	AVG MONTHLY GAS BILL
<$500	$71
$500-$999	$75
$1000-$1499	$93
$1500+	$95

So, too, did a 1987 study of Delaware fuel assistance households make similar findings. That study concluded that "LIHEAP households tend to consume near the minimum requirement for their dwelling type."\10\ The University of Delaware study found the relationship between income and energy use to be as follows:

GROSS INCOME	MILLION BTU OF USE

\9\Direct Testimony and Exhibits of Eunice Grier, Re. Philadelphia Gas Works, on behalf of The Public Advocate (July 1989).

\10***Energy Needs and Costs of Low-Income Households: A Preliminary Profile of Delaware LIHEAP Clients***, Center for Energy and Urban Policy Research, University of Delaware (1987).

$1-4000	99.16
$4001-5500	102.97
$5501-7000	110.96
$7001-8500	118.38
$8501+	117.40
AVERAGE	107.39

The finding that poor households use less energy is consistent throughout the nation. According to the U.S. Department of Energy,\11\ for example, natural gas bills, where gas is used as the primary heating source, decline as income declines for each region of the country:\12\

\11\U.S. Department of Energy, Energy Information Administration, ***Consumption and Expenditures 1987, Part I: National Data*** (January 1990).

\12\The regions include: NE=New England; MA=Mid-Atlantic; ENC=East North Central; WNC=West North Central; SA=South Atlantic; ESC=East South Central; WSC=West South Central; MT=Mountain; and P=Pacific.

INCOME $(000)	NE	MA	ENC	WNC	SA	ESC	WSC	MT	P
Average:	$738	$743	$562	$464	$533	$384	$354	$424	$327
<$10	$700	$651	$520	$422	$465	$370	$320	$360	$288
$10-19.9	$757	$650	$511	$445	$459	$338	$318	$426	$269
$20-34.9	$662	$704	$509	$451	$567	$376	$379	$410	$271
$35+	$813	$892	$592	$531	$604	$472	$409	$496	$398

Similar results have been found for fuel oil bills where fuel oil is the primary heating source:

INCOME $(000)	NE	MA	ENC	WNC	SA	ESC	WSC	MT[13]	P
Average:	$634	$597	$$496	$398	$397	NA	NA	NA	NA
<$10	$550	$466	NA	$314	$430	NA	NA	NA	NA
$10-19.9	$513	$590	$510	NA	$474	NA	NA	$247	NA
$20-34.9	$599	$497	$454	$518	$430	NA	NA	$170	NA
$35+	$753	$799	$524	NA	$557	NA	NA	$166	NA

Finally, DOE found electric bills (for houses using electricity as their primary heating source), to vary inversely with income:

[13] Due to a scarcity of data, this data is for the entire western region, not simply the Mountain States Region. In the Tables, the term "NA" means that DOE reported that insufficient data existed to determine statistically reliable results.

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INC $(000)	NE	MA	ENC	WNC	SA	ESC	WSC	MT	P
Average:	$1,055	$1,186	$1,259	$1,117	$1,123	$1,001	$958	$1,026	$640
<$10	$543	NA	$1,159	NA	$381	$706	$803	$732	$576
$10-19.9	$788	$826	$1,074	$973	$412	$909	$714	$786	$587
$20-34.9	$1,404	$1,136	$1,103	$977	$364	$1,017	$1,076	$928	$689
$35+	$1,313	$1,449	$1,606	$1,597	$454	$1,317	$1,083	$1,335	$862

The variance in energy costs as a function of income becomes even more apparent when total household energy bills are examined, rather than simply heating bills. For example, DOE found that total energy bills, when gas is used as the primary heating source, varied inversely with income:

INC $(000)	NE	MA	ENC	WNC	SA	ESC	WSC	MT	P
Average:	$1,220	$1,329	$1,113	$1,053	$1,171	$990	$1,104	$923	$800
<$10	$1,028	$983	$988	$808	$955	$756	$839	$716	$601
$10-19.9	$1,196	$1,139	$990	$967	$942	$895	$938	$901	$594
$20-34.9	$1,129	$1,266	$1,072	$1,054	$1,191	$1,084	$1,253	$886	$717
$35+	$1,409	$1,683	$1,364	$1,329	$1,445	$1,286	$1,462	$1,175	$1,002

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Similar results were found for total energy bills when fuel oil is used as the primary source of heat:

INC. $(000)	NE	MA	ENC	WNC	SA	ESC	WSC	MT	P
Average:	$1,284	$1,299	NA	NA	$1,185	$1,189	NA	NA	NA
<$10	$985	$942	NA	$851	$1,058	NA	NA	NA	NA
$10-19.9	$1,111	$1,194	$1,363	NA	$1,162	NA	NA	NA	NA
$20-34.9	$1,209	$1,172	$1,282	$1,241	$1,238	NA	NA	NA	NA
$35+	$1,584	$1,758	$1,380	NA	$1,357	NA	NA	NA	NA

Finally, DOE found total energy bills for houses using electricity as their primary heating source, to vary inversely with income:

INC. $(000)	NE	MA	ENC	WNC	SA	ESC	WSC	MT	P
Average:	$1,084	$1,217	$1,300	$1,159	$1,142	$1,017	$994	$1,058	$683
<$10	$543	$942	$1,172	NA	$799	$717	$842	$748	$565
$10-19.9	$881	$1,194	$1,089	$993	$888	$922	$732	$821	$579
$20-34.9	$1,404	$1,172	$1,172	$1,034	$1,141	$1,030	$1,116	$960	$669
$35+	$1,338	$1,758	$1,645	$1,643	$1,474	$1,343	$1,124	$1,371	$804

Indeed, in every state but Alaska (where bills are virtually the same over

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income levels) are the energy bills for low-income families (with a head of household younger than 60) lower than their counterparts with higher incomes.

INSERT STATE-BY-STATE BREAKDOWN FROM TAX REPORT

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In sum, energy consumption for low-income households tends to be less than energy consumption for households with moderate and upper incomes as well as less than average consumption for the population as a whole. These patterns are consistent across geographic regions and for every state. Finally, this pattern of energy consumption has held true over time. Neither the relatively poorer housing stock inhabited by low-income households nor the relatively older and more inefficient heating systems results in low-income energy use equal to or greater than either that of the population as a whole or that of particular higher income categories.

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II. REASONS FOR LOW-INCOME USAGE.

The relatively lower energy use for low-income families can be explained by low-income household characteristics. Moreover, a complete understanding of the components of household energy use help explain why home heating might have impacts on total consumption that are more limited than might otherwise be expected.

While home heating costs are a major component of a household's annual natural gas bill, other end uses contribute significantly as well.\14\ As a result, changes in home heating costs have a proportionately smaller effect on changes in total energy costs. Columbia Gas of Pennsylvania, for example, explained the components which make up a typical natural gas bill (for a household that heats with natural gas). According to Columbia Gas, the average household uses the following amounts of natural gas each year for the following end uses:

\14\ Natural gas is discussed here only because that is the data which is available.

END USE	USE LEVEL (MCF)	PCT OF TOTAL
HEATING:	87.9	0.68
HOT WATER:	34.5	0.27
COOKING:	6.0	0.05
TOTAL:	128.4	1.00

As can be seen, hot water and cooking use make up nearly one-third of total natural gas consumption. Moreover, since *that* consumption tends to remain constant over income levels, those differences which do appear are likely attributable to the space heating component.

Given this data, it is not surprising that low-income households do not ipso facto have --simply because of old housing stock and heating units-- the higher consumption often assumed. A substantial part of the energy cost incurred by the poor is not affected by these characteristics.

Even within the heating component of a low-income energy bill, low-income characteristics tend to support a finding of lesser rather than greater energy use as compared to the population as a whole. The primary cause of this phenomenon is the fact that low-income households tend to be renters living in multi-unit buildings with per dwelling unit energy consumption less than the total population average and certainly less than single family

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detached dwellings.

Low-income households tend to be renters who live in multi-unit buildings rather than owners of single family detached homes. The National Consumer Law Center has consistently found this to be the case in studies of LIHEAP populations around the country:

	DATE	PERCENT RENTERS
WISCONSIN:\15\	1985	72%
RHODE ISLAND:\16\	1986	77%
MARYLAND:\17\	1987	73%
MINNESOTA:\18\	1986	29%
MAINE:\19\	1988	67%
PHILADELPHIA:\20\	1989	72%

\15\National Consumer Law Center, ***Evaluation of Wisconsin Gas Company's Proposal for A Guaranteed Service Plan*** (1985).

\16\National Consumer Law Center, ***Percentage of Income Plans: Final Report to the Low-Income Task Force of the Rhode Island Public Utilities Commission*** (1986).

\17\National Consumer Law Center, ***Evaluation of Maryland's Winter Heating Protection Program*** (1987).

\18\National Consumer Law Center, ***Evaluation of Minnesota Fair Share Pilot Program*** (1986).

\19\National Consumer Law Center, ***An Evaluation of Low-Income Utility Protections in Maine: Fuel Assistance and Family Crisis Benefits***, Volume III, (1988). This figure looks only at households who defaulted on winter payment arrangements.

\20\Direct Testimony and Exhibits of Eunice Grier, Re. Philadelphia Gas Works, on behalf of The Public Advocate (July 1989).

	DATE	PERCENT RENTERS

The U.S. Department of Energy, in its Residential Energy Consumption Survey (RECS) previously cited, found a dramatic relationship between rental status and energy consumption. The DOE reported that for every region, as well as for the country as a whole, this relationship existed:

	ALL EN. RENTER	ALL EN. OWNER	GAS RENTER	GAS OWNER	OIL RENTER	OIL OWNER	ELEC RENTER	ELEC OWNER
COUNTRY:	$ 819	$1,221	$ 816	$1,218	$ 977	$1,397	$ 746	$1,264
NEW ENGL:	$ 964	$1,386	$1,088	$1,417	$ 933	$1,415	$ 727	$1,799
MID-ATL:	$ 945	$1,489	$1,001	$1,483	$ 927	$1,566	$ 810	$1,504
EAST NO. CENTRAL:	$ 881	$1,277	$ 844	$1,273	$1,254	$1,306	$ 954	$1,475
WEST NO. CENTRAL:	$ 820	$1,159	$ 785	$1,177	NA	$1,232	$1,084	$1,197
SOUTH ATL:	$ 909	$1,243	$ 951	$1,311	$1,123	$1,213	$ 869	$1,282
EAST SO. CENTRAL:	$ 746	$1,099	$ 737	$1,139	NA	$1,199	$ 718	$1,171
WEST SO. CENTRAL:	$ 800	$1,204	$ 855	$1,200	NA	NA	$ 733	$1,357
MOUNTAIN:	$ 773	$1,018	$ 770	$986	NA	NA	$ 776	$1,252
PACIFIC:	$ 571	$ 935	$ 563	$ 976	NA	NA	$ 545	$ 885

The National Consumer Law Center has found this relationship between higher heating bills and rental status as well:

	HOMEOWNER BILL	RENTER BILL
WISCONSIN	$1,091	$ 974
RHODE ISLAND	$ 912	$ 733
MARYLAND\21\	$ 905	$ 632
MINNESOTA	$1,177	$ 940
PHILADELPHIA	$ 984	$ 900

In reviewing these analyses, it is important to remember that tenancy unto itself is not associated with lower energy use. Instead, tenancy tends to be associated with the type of dwelling unit: single family detached or multi-family.

When measured directly, the difference between the energy use in single family detached dwellings and multi-unit dwellings is even more stark. The U.S. Department of Energy reported in its RECS:

	ALL EN. 1-UNIT	ALL EN. 2-UNIT+	GAS 1-UNIT	GAS 2-UNIT+	ELEC 1-UNIT	ELEC 2-UNIT+
COUNTRY:	$1,218	$ 771	$1,204	$ 775	$1,287	$ 694
NEW ENGL:	$1,506	$ 950	$1,481	$1,033	$1,560	$ 748

\21\This report looks at apartments versus single family detached homes. Badua, et al., ***Energy Needs and Costs of Low-Income Households: A Preliminary Profile of Delaware LIHEAP Clients***, Center for Energy and Urban Policy Research, University of Delaware (1987).

MID-ATL:	$1,527	$ 941	$1,484	$1,022	$1,528	$ 765
EAST NO. CENTRAL:	$1,292	$ 798	$1,284	$ 800	$1,457	$ 748
WEST NO. CENTRAL:	$1,162	$ 714	$1,170	$ 708	$1,258	$ 890
SOUTH ATL:	$1,246	$ 816	$1,313	$ 829	$1,311	$ 803
EAST SO. CENTRAL:	$1,080	$ 667	$1,101	$ 661	$1,168	$ 675
WEST SO. CENTRAL:	$1,145	$ 724	$1,149	$ 750	$1,287	$ 714
MOUNTAIN:	$1,041	$ 683	$1,008	$ 691	$1,307	$ 661
PACIFIC:	$ 936	$ 529	$ 955	$ 518	$ 929	$ 560

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So, too, did NCLC find this relationship:

	1-UNIT	3+-UNITS
WISCONSIN	$1,132	$ 677
RHODE ISLAND	$ 885	$ 726
MINNESOTA	$1,177	$ 746

Unlike the stereotype of the poor living in a huge rambling uninsulated house with an old and inefficient heating system, the more accurate picture of a low-income household is one where a family rents a multi-family dwelling which, even if energy inefficient, is small enough and has the natural insulation arising from multi-unit dwellings to use less energy than the single family detached homes owned by households with more moderate means.

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III. PUBLIC POLICY IMPLICATIONS.

The proportionately lesser consumption by low-income households has clear public policy implications in at least the following three areas:

1. **CONSERVATION:** Low use cannot be equated to a lack of conservation potential in low-income households. Even low use by the poor can involve substantial waste. For the poor, low-use more likely reflects the type of dwelling than any level of energy efficiency. Conservation programs using minimum consumption levels as an eligibility criterion should be resisted. Nevertheless, energy conservation is not "the" answer to low-income energy problems. With the lesser energy consumption that low-income households tend to have, insufficient potential exists to bring low-income energy bills into an affordable range through conservation alone. Some form of cash assistance is necessary as well.

2. **RATE DISCOUNTS:** Use of total population average consumption will result in an overstatement of the cost of rate discounts. A 25 percent discount on a $600 low-income bill, in other words, will result in a much lower shortfall than a 25 percent discount on a $1,000 bill for the total population.

3. **PERCENTAGE OF INCOME PLANS:** Use of total population average consumption will result in an overstatement of the shortfall between household payments and actual energy bills in any

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evaluation of Percentage of Income Plans (PIPs). A low-income household, in other words, is much more likely to cover all or some substantial portion of a low-income bill through a household percentage of income payment than it is to cover a bill equal to the total population average.

In sum, imputing a total population average energy consumption to low-income households will:[\22\]

1. Erroneously limit eligibility for conservation services;
2. Erroneously inflate the cost of utility rate discounts; and
3. Erroneously inflate the shortfall arising from Percentage of Income Plans (PIPs).

[\22\] Care must be taken on use of this data, however. While it may be beneficial in the listed energy contexts to point out that low-income energy use is less than the total population average, that conclusion may redound to the *detriment* of low-income households in instances such as determining AFDC energy cost disallowances, setting Section 8 energy allowances, and other similar programs.

APPENDIX A

STATES BY CENSUS REGION

NEW ENGLAND:

Maine
Vermont
New Hampshire
Massachusetts
Connecticut
Rhode Island

MID-ATLANTIC:

New York
New Jersey
Pennsylvania

EAST NORTH CENTRAL:

Wisconsin
Michigan
Ohio
Indiana
Illinois

WEST NORTH CENTRAL:

Minnesota
Iowa
Missouri
Kansas
Nebraska
South Dakota
North Dakota

SOUTH ATLANTIC:

Maryland
Delaware
West Virginia
Virginia
North Carolina
South Carolina
Georgia
Florida

EAST SOUTH CENTRAL:

Kentucky
Tennessee
Alabama
Mississippi

WEST SOUTH CENTRAL:

Oklahoma
Arkansas
Louisiana
Texas

MOUNTAIN:

Montana
Idaho
Wyoming
Colorado
Utah
Nevada
New Mexico
Arizona

PACIFIC:

Washington
Oregon
California
Alaska
Hawaii

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