

**UTILITY-FINANCED
LOW-INCOME ENERGY CONSERVATION:**

Winning for Everyone

PREPARED FOR:

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July 1991

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Energy conservation has become an accepted mechanism for providing a full range of energy services to utility customers today. A wide range of factors has contributed to the recognition that utility-provided conservation is not only appropriate, but absolutely essential. The conservation of energy helps preserve scarce natural resources, including both oil and natural gas. The conservation of energy helps protect the environment, as it displaces the consumption of environmentally destructive coal burning. The conservation of energy helps maintain reasonable utility rates, in those instances where the costs of production exceed the costs of conservation.

Offering energy conservation can promote these goals while at the same time promoting the beneficial goal of providing necessary rate relief to low-income households as well. Moreover, in providing low-income rate relief through conservation, a utility furthers not only the social goal of preventing utility arrears and shutoffs, but furthers, also, the goal of lowering the cost of service to all of its remaining ratepayers. The analysis below is divided into xx sections. **Part I** looks at the justification for the offer of utility-financed conservation programs in general. **Part II** looks at low-income energy needs and posits that the offer of specific low-income conservation programs can help address those needs. **Part III** looks at what market barriers prevent low-income participation in conservation programs and what equitable problems arise because of that nonparticipation. **Part IV** looks at the increased number of low-income conservation measures that can be justified on the basis of the higher avoided costs associated with low-income

ratepayers. **Part V** examines the increased contribution toward fixed system costs that can be obtained when low-income conservation programs are offered in tandem with low-income rate relief. Finally, **Part VI** looks at why households do not participate in low-income conservation programs and how public utilities might respond to such reasons. **Part VII** sets forth several proposals for the involvement of Alabama utilities in the provision and promotion of low-income conservation programs.

I. DEMAND SIDE MANAGEMENT MEASURES AND THE PROVISION OF LEAST-COST SERVICE.

The need for public utility companies to provide energy conservation and other demand side management (DSM) measures as part of their "public service" has been well documented in recent years.¹¹ Public utility companies are under a statutory and common law duty to provide least-cost service to ratepayers.¹² Moreover, under the explicit dictates of the famous U.S. Supreme Court decisions in *Hope*¹³ and *Bluefield*,¹⁴ utilities are under a regulatory obligation to provide service after having implemented all reasonable efficiencies.

In the event, therefore, that the offer of demand side management measures will result in the provision of least-cost service, public utilities are under an obligation to provide such measures.

A. THE CONCEPTUAL BASIS FOR CONSERVATION PROGRAMS.

According to at least one public utility commission, the obligation to provide least-cost service contemplates more than least-cost service in the

¹¹See e.g., Colton, "Conservation, Cost-Containment and Full Energy Service Corporations: Iowa's New Definition of 'Reasonably Adequate Utility Service,'" 34 *Drake Law Journal* 1 (1985).

¹²See generally, Colton, "Utility Involvement in Energy Management: The Role of a State Power Plant Certification Statute." 16 *Environmental Law* 175 (1986).

¹³*Federal Power Commission v. Hope Natural Gas Company*, 350 U.S. 591 (1944).

¹⁴*Bluefield Water Works v. Public Service Commission of West Virginia*, 262 U.S. 679 (1923).

short-term. According to the Wisconsin Public Service Commission, the requirement that utilities engage in the provision of reasonably adequate and least-cost service encompasses the principle that service *remain* reasonably adequate and least-cost over the long-term. The Wisconsin PSC very early on recognized this rationale for directing utilities to participate in providing energy conservation measures. In establishing its mandatory financing program for gas utilities in 1977, for example, the Wisconsin PSC cited, as support for "certain fundamental predicates" of the program,⁵ *Wisconsin Environmental Decade v. Public Service Commission*,⁶ in which the Wisconsin supreme court held: "the power to regulate so that the rules and practices of the utilities do not render service inadequate or insufficient raises by fair implication the power to regulate so that service will remain as reasonably adequate and sufficient in the future as practicable."⁷ This duty to regulate so that service "will remain reasonably adequate and sufficient," the Wisconsin PSC stated, "becomes increasingly apparent in light of the diminishing supply of natural gas."⁸ The task of the PSC, it concluded, was accordingly "to require utility practices that will extend (the gas) supply as far into the future as is realistically practicable by adopting conservation policies."⁹

⁵*In Re. Class A Gas Utility Residential Insulation Program*, Wisc. PSC Dckt. No. 05-GV-2 (issued September 22, 1977).

⁶230 N.W.2d 243 (Wis. 1975).

⁷230 N.W.2d at 251.

⁸Wis. PSC Dckt. 05-GV-2, *supra* note Error! Bookmark not defined., at 3.

⁹*Id.*

The offer of conservation services can provide immediate financial benefits in addition to serving as a mechanism for extending current sources of energy (whether those sources be coal or oil or natural gas). This is part and parcel of today's "least-cost planning" efforts.

The goal of least-cost planning is to provide utility service to customers at the lowest possible revenue requirement with an adequacy of service constraint. If, in other words, reasonably adequate service can be maintained by "producing" electricity or natural gas through demand side measures at a lesser cost than by producing such energy through supply-side measures, the demand-side measures should be pursued.

B. THE HISTORICAL CONTEXT.

The theoretical justification for least-cost planning must be viewed in an historical context. Economically, the utility industry has long been viewed as a natural monopoly. A natural monopoly exists when a single firm can provide the least-cost service over the entire range of demand for the product. Because of this attribute, competition does not work to allocate resources efficiently. The entry of a competitor into a natural monopolist's market would split demand between two producers thus lowering the output for the existing firm. Since, by definition, the demand would be served most cheaply by one company, costs will necessarily increase both absolutely and on an average cost basis.

Natural monopolies are frequently characterized by indivisibilities of investment. An indivisibility exists when capital expansion is by its nature chunky, with small incremental construction being either uneconomical or impossible. The construction of power plants and gas pipelines are examples, because certain economies of scale may be associated with larger scale facilities. The entry of a competitor into a market marked by such indivisibilities of investment will create substantial excess capacity problems for the existing firm because part of its output will be siphoned off by the new producer. In the energy industry, where energy use is now stable or declining, either the excess capacity will remain unused for a significant period of time or prices for the energy will need to be lowered to promote increased demand. In the first instance, a misallocation of resources occurs, because capital

investment would stand unused. In the latter instance, price levels for the existing firm would necessarily be below those that would compensate the utility for the full costs of the plant.

Largely due to these considerations, the energy utility industry was perceived by policymakers to need "official" monopoly status, with regulation acting as a surrogate for competition. It was believed that the state monopoly grant would, through the development and recognition of exclusive service territories, preserve the economies associated with a natural monopoly for the benefit of consumers. At the same time, rate regulation would prevent the exaction of monopoly profits and control the potential for monopoly-supported price discrimination.

A dual economic and regulatory justification for the provision of least-cost services is thus apparent. First, only in the event that an energy provider can supply its customers at a lesser cost than its potential competitors, individually or collectively, is the claim of "natural monopoly" status cognizable. If an additional firm could be added within a given service territory with a concomitant lowering of costs, or if a substitute firm could supplant the present supplier with resulting lowered costs, the economic justification for recognition in the first instance of exclusive territories based upon "natural monopoly" claims would disappear. Second, if, on the other hand, the legitimacy of the monopoly status is assumed, "least-cost" regulation is necessary to stand

between the firm and the potential price abuses which its control portends. Under either theory, the pursuit of least-cost operations is justified.

The test for whether conservation and weatherization measures should be pursued in this context is whether, through the implementation of such measures, the utility will lower its total revenue requirement to ratepayers. The essence of a cost-effectiveness test is whether total revenue requirements are lesser with rather than without the conservation measures.

C. THE DETERMINATION OF COST-EFFECTIVENESS.

A conservation measure is cost-effective if it results in lower total revenue requirements to a utility. The cost which is avoided by implementing the conservation measure is a systemwide benefit and, at least in theory, inures to the benefit of all ratepayers.^{10\} That all customers are better off in such an instance is illustrated by two simple examples using a hypothetical utility:

1. The production cost of Utility A is currently 5 cents per KWH.

Incremental production costs are 4 cents per KWH. There are ten ratepayers (RP1 - RP10), each of whose bill is \$100 per month. The utility's revenue requirement is \$1,000 per month.

^{10\}This is true even though each specific conservation measure is installed in a particular individual's home or in a particular factor, school or commercial business. Despite the individual nature of the placement of the measure, the measure represents a systemwide investment in providing adequate service at least-cost and the savings represent a systemwide savings.

Utility A has identified an opportunity to reduce revenue requirement by \$40 by installing radio control devices on the water heaters of customers with a certain class of water heaters. Ratepayers 1 and 2 (RP1 and RP2) have this kind of water heater but Ratepayers 3 through 10 do not. By assumption, there would be no installation of these devices without a utility program to purchase and install them.

The equipment and all other program costs are \$25. The installation on the heaters of RP1 and RP2 results in a savings to the system of \$40. This \$40 is made up of a reduction in the KWH used by each RP1 and RP2 of \$20/4 cents = 500 KWH (or 1,000 KWH when both are summed). The cost of the program per KWH saved is \$25/1,000 KWH = 2.5 cents. Since the savings of the program exceed the cost, the program is cost-effective.

2. Utility A has ten ratepaying customers (RP1 through RP10). Each pays a bill of \$100 per month. The total revenue requirement of Utility A is \$1,000. Demand for electricity from the ten ratepayers is forecasted to increase by 10 percent in the next month. The incremental cost of meeting this 10 percent increase in demand through the least-cost supply-side alternative is the same as the existing cost per KWH.

Utility A has a choice of either implementing this new supply-side measure for \$100 total, thereby raising its revenue requirement to \$1,100 or solving the problem by passing out "free" water heater blankets, costing \$9.99, to each ratepayer. If the supply measure is adopted, the revenue requirement will be \$1,100, and the average bill will be \$110. If the water heater blankets are passed out, the revenue requirement will be \$1099.90 and the average bill will be $\$1099.90/10 = \109.99 . Here, the water heater blanket is a perfectly adequate substitute for the supply-side action but costs less; it is the cost-effective alternative and should be pursued.

D. SUMMARY.

In sum, public utilities should maximize the demand side management techniques that they can offer to their customers. These programs provide current benefits in the form of reduced rates. In addition, they help extend the adequacy of future energy services. They conserve scarce natural resources and protect the environment.

The thesis of this analysis, however, is that to the extent that the portfolio of such programs reach the poor in particular, additional benefits will arise. To understand this thesis, it is necessary to understand the payment problems faced by Alabama's low-income households.

II. THE PAYMENT-TROUBLE PROBLEMS OF LOW-INCOME HOUSEHOLDS.

A. THE INCOME SHORTFALL OF POVERTY HOUSEHOLDS.

Little question exists today but that low-income households have insufficient money to pay their home energy bills. Low-income households simply have insufficient funds to pay all of their necessary home expenses. A good surrogate for low-income households in general are those households who received fuel assistance benefits pursuant to the federal Low-Income Home Energy Assistance Program (LIHEAP).^{11\} In Alabama, the adequacy of fuel assistance benefits to provide relief for low-income energy bills can be examined through a variety of specific programs, including AFDC,^{12\} SSI,^{13\} unemployment and Social Security.

Low-income households in Alabama are not "making it." Data from the Low Income Home Energy Assistance Program (LIHEAP) for FY 1988 is an excellent surrogate for low-income households in general. Statewide, Alabama households who participated in LIHEAP had an average income of less than \$6,000 in 1988. Of that money, households devoted, on average, \$860 toward their annual home energy costs (more than 15 percent of their annual income).

^{11\}Under LIHEAP, households eligibility must be set in a range from 150 percent of poverty down to 110 percent of Poverty (or 60 percent of the state's median household income). statutory cite.

^{12\}Aid to Families with Dependent Children.

^{13\}Supplemental Security Income.

Specific data on households which depend on AFDC, SSI, Social Security and unemployment as their primary source of income is even more telling of the energy plight of low-income Alabama residents. The maximum monthly benefit for an **AFDC** household of three in 1988 in Alabama was \$118. Alabama's AFDC households have on average \$2 per week remaining for all other living expenses after paying their winter home heating costs. The maximum monthly benefit for an elderly individual receiving **SSI** in January 1988 in Alabama was \$354. That individual would have an average of \$57 per week left after paying her winter home heating bills. The average monthly **Social Security** benefit to nondisabled widows and widowers in Alabama in 1988 was \$406. After paying winter home heating bills, these households have a weekly income left of \$69 for all other living expenses. Finally, the average monthly **unemployment** benefit in Alabama in 1988 was \$438. After paying their winter home heating bills, these households had an average weekly income left of \$77 for all other living expenses.

The potential for payment-troubled customers to pose major collection programs is as real in rural areas as it is in major urban centers. Indeed, the plight of the rural poor can be substantial. According to one recent national study, by 1987, "a person living in a nonmetropolitan area (was) almost as likely to be poor as someone living in the central city of a metropolitan area."¹⁴⁾

¹⁴⁾Kathryn Porter, *Poverty in Rural American: A National Overview*, Center on Budget and Policy Priorities (August 1989). Porter noted that: "In 1987, the poverty rate was 16.9 percent in nonmetro areas

Moreover, compared to 1978, poverty rates had risen as much in rural areas as in the nation's central cities.^{\15\} In general, nearly two-fifths of all poor people, including the rural poor,^{\16\} have income below half the poverty level.^{\17\}

The rural poor tend to disproportionately include the elderly and families with children. Children in nonmetropolitan areas have poverty rates as high as the poverty rates for children living in central cities.^{\18\} The nonmetro elderly (those 65 and older) are another group for whom poverty rates are as high or higher than for their central city counterparts.^{\19\}

In sum, there is a substantial need for assistance flowing to low-income households in both urban and rural areas. Poverty is not simply a central city problem. Indeed, for some populations (such as children and the elderly), rural poverty represents a greater problem than urban poverty does.

(. . continued)

--higher than the 12.5 percent poverty rate in metropolitan areas and almost as high as the 18.6 percent poverty rate in central cities." *Id.*, at 3.

^{\15\}*Id.*, at 4. "Between 1978 and 1987, poverty rates in both nonmetro areas and central cities rose by more than one-fifth --from 13.5 percent to 16.9 percent in nonmetro areas, and from 15.4 percent to 18.6 percent in central cities."

^{\16\}This includes 38.6 percent of those in nonmetro areas and 40.4 percent of those in central cities. *Id.*, at 10.

^{\17\}This represents an annual income of below \$4,528 for a family of three. *Id.* at 10.

^{\18\}*Id.*, at 9. "In nonmetro areas, nearly one-quarter of all children (23.1 percent) are poor, compared to a poverty rate of nearly three out of ten (29.6 percent) among children living in central cities."

^{\19\}*Id.*, at 10. "In 1987, the poverty rate among elderly people living in nonmetro areas --15.6 percent-- was not significantly different from the poverty rate for elderly people in central cities --14.3 percent."

The public responses which might be appropriate as a means to react to these payment problems fall into two genres. First, the household income can be increased. Such increases could come in the form of increased cash assistance through increased public benefits. Second, household expenses can be decreased. In the fuel area, this can occur either through the grant of discounted rates *or* through the offer of energy conservation and weatherization measures that will improve the efficiency of home energy use.

The low-income conservation program proposed below endorses this latter tack. It posits that a comprehensive conservation and weatherization program directed toward households living at or below 150 percent of the federal Poverty Level will yield benefits to the low-income household (as home energy bills are made more affordable); to the utility (as not only energy supply costs, but credit and collection costs, are reduced as a result); to the state (as limited fuel assistance dollars are spread more efficiently and effectively); and to local city and county governments (as households maintain their homes and fewer dwelling units are abandoned, thus maintaining the tax base and decreasing local expenditures on a variety of community programs).

Moreover, the program discussed below posits that when a utility engages in the offer of residential conservation programs in general, basic notions of fairness and equity dictate that special programs be offered to

low-income households with participation in these programs being based upon income, itself, as the eligibility criteria.

B. THE TIE BETWEEN PAYMENT PROBLEMS AND ENERGY BILLS.

The tie between energy payment problems and the high energy bills that low-income households often face has oft been noted. The image is strong of poor households who live in old rambling dilapidated homes with little or no insulation along with old and inefficient home heating units. Broken windows, unrepaired roofs and dwellings that lack even the most rudimentary conservation measures (such as storm windows and doors) complete the picture.

A 1988 report in Maine provided evidence of the direct relationship between home energy use and energy bill payment problems. In its study of payment plans done for the Maine Public Utilities Commission, NCLC graphically drew the connection between higher bills and arrears.^{120\} The Maine analysis found that within the payment plan populations for both utilities studied,^{121\} households having the highest usage tend to have the higher arrears. Two points of comparison were used to draw these conclusions: (1) total annual consumption; and (2) average monthly winter consumption.^{122\}

^{120\}National Consumer Law Center, *An Evaluation of Low-Income Utility Protections in Maine: Payment Arrangements for Maine's Electric Utilities*, Volume II, at 60 - 67 (July 1988).

^{121\}The two utilities included Central Maine Power Company and Eastern Maine Electric Cooperative.

^{122\}*Id.*, at 60.

A "clear correlation" between total annual usage and the level of arrears was found for Central Maine Power Company. According to the Maine research, the average total arrears for Central Maine Power Company was \$48. However, while households with an annual consumption greater than 16,000 KWH had an average arrears of \$88, for example, households with less than 5,000 KWH of use had an average arrears of only \$10.

The association held with monthly winter consumption, the Maine study found. Total arrears for customers with consumption over 2000 KWH were nearly twice the payment plan average (\$91 vs. \$48) and nearly triple the arrears of households at the lower consumption levels (\$91 vs. \$33). The breakpoint for particular payment problems occurred at a winter monthly usage of around 1300 KWH. Households falling into the band of from 1300 to 2000 KWH per winter month averaged total arrears of \$82, again substantially above the total payment plan population.^{123\}

Similar results were found for the Rural Electric Cooperative. The average total arrears facing the Co-op's payment plan customers, the report found, was \$40. "In contrast to this average, however, is the sub-population of households with annual usage in excess of 16,000 KWH. Those customers

^{123\} **Id.**, at 62.

had an average arrears of \$214, more than five times the total population average."^{24\}

The association between winter usage and arrears was confirmed with the Co-op also. According to the Maine research, "the \$272 average arrears for persons with winter usage of more than 2000 KWH was nearly seven times the \$40 total payment plan population average; even at usage levels of from 1300 to 2000 KWH per month, the \$118 average arrears was nearly triple the total population average."

The Maine report concluded that "the level of a household's consumption is highly correlated with the level of that household's arrears.* *
*Payment plan households tend to be households which have a continuing mismatch between available resources and household expenses. They tend not to be customers for whom cash flow changes would be beneficial; rather an absolute shortfall in resources is apparent and continuing payment problems can be observed."^{25\} Indeed, the study found that even those households who successfully complete a payment plan in one year could be expected to be forced into entering into another payment plan the next year, as winter bills exceed winter incomes.

^{24\}Id., at 63.

^{25\}Id., at 66.

C. THE ENERGY BILLS OF LOW-INCOME HOUSEHOLDS.

This picture of high bills leading to high arrears, however, is at best incomplete and at worst perhaps inaccurate. In the total population, as opposed to the payment-troubled population, arrears and energy use are not necessarily associated. Moreover, energy use does not necessarily increase as incomes go down. Indeed, the bulk of the empirical analysis that has been performed indicates the opposite, that energy use *decreases* as income decreases. According to one report,^{126\} "despite their payment-troubled status, contrary to what is perhaps popular perception, it is not necessarily the case that the payment troubles of low-income households are caused by substantially greater energy consumption. Indeed, a number of studies indicate that low-income households have **less** consumption than their higher income counterparts."^{127\}

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),^{128\} 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

^{126\}National Consumer Law Center, *Energy Use and the Poor: The Association of Consumption with Income (1990)* (emphasis in original).

^{127\}National Consumer Law Center, *Controlling Uncollectible Accounts in Pennsylvania: A Blueprint for Action* (December 1990). (citations omitted).

^{128\}U.S. Department of Energy, Energy Information Administration, *Consumption and Expenditures 1987, Part II: Regional Data* (January 1990).

of fuel sources used for heating, including natural gas, fuel oil and electricity. For each of these fuels, standing alone, as well as for total energy consumption, energy use goes up as income goes up:

**TABLE A
TOTAL ENERGY BILLS BY INCOME (NATIONAL)
BY PRIMARY HEATING FUEL**

INCOME	TOTAL ENERGY	NATURAL GAS	OIL	ELECTRICITY
All households:	\$1,080	\$1,073	\$1,260	\$1,038
<\$10,000:	\$ 859	\$ 868	\$ 985	\$ 772
\$10,000-\$19,999:	\$ 944	\$ 933	\$1,170	\$ 830
\$20,000-\$34,999:	\$1,072	\$1,057	\$1,196	\$1,040
\$35000+:	\$1,347	\$1,330	\$1,662	\$1,306

This DOE data is consistent with other studies of the same issue. For example, a study released by the National Council of Senior Citizens 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.^{129\}

**TABLE B
ELDERLY HOUSEHOLD ENERGY CONSUMPTION
POOR VS. NON-POOR**

	HEAT WITH OIL	HEAT WITH GAS/ELECTRICITY

^{129\}*Double Jeopardy: The Impact of Energy Taxes on Low-Income Households*, National Council of Senior Citizens (1988).

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.^{130\} Low-income households in 1975, WCMS found, had annual electric use 55 percent less than all households (60.6 MBTU vs. 94.2 MBTU) and paid 48 percent less per year (\$188 vs. \$278).^{131\}

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).^{132\}

For natural gas customers, the comparison between income ranges was even more stark. The WCMS found the following natural gas usage patterns:

**TABLE C
NATURAL GAS CONSUMPTION BY INCOME RANGE**

Income:	<\$14,000	\$14000-\$25,000	\$25,000+
Avg. ann. MBTU:	110.1	137.4	190.5

^{130\}Colder--Darker, Washington Center for Metropolitan Studies (1977).

^{131\}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).

^{132\}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).

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:¹³³⁾

**TABLE D
ELECTRIC CONSUMPTION BY INCOME RANGE**

INCOME	Low-income	\$14,000-\$25,000	\$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:¹³⁴⁾

**TABLE E
AVERAGE MONTHLY GAS BILL
BY INCOME RANGE (PHILADELPHIA)**

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

¹³³⁾ Syracuse Research Corporation, *Low-Income Families and High Energy Costs: An Economic Study* (1978).

¹³⁴⁾ Direct Testimony and Exhibits of Eunice Grier, *Re. Philadelphia Gas Works*, on behalf of The Public Advocate (July 1989).

A 1987 study of Delaware fuel assistance households made similar findings. That study concluded that "LIHEAP households tend to consume near the minimum requirement for their dwelling type."³⁵ The University of Delaware study found the relationship between income and energy use to be as follows:

³⁵*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).

**TABLE F
AVERAGE ENERGY CONSUMPTION (MMBTU)
BY INCOME RANGE (DELAWARE)**

GROSS INCOME	MILLION BTU OF USE
\$1-4000	99.16
\$4001-5500	102.97
\$5501-7000	110.96
\$7001-8500	118.38
\$8501+	117.40
AVERAGE	107.39

It becomes clear from this data that, contrary to popular perception, low-income households do not face ongoing payment troubles because of the unreasonably high energy consumption that is associated with dilapidated housing, inefficient heating systems, and other structural problems with their dwelling units. Indeed, contrary to that popular perception, low-income households face payment problems *despite* the proportionately *lower* consumption that they have relative to their more wealthy counterparts. That some additional factor must be present is clear. That "additional factor," as discussed below, is the interplay between consumption and incomes, what has been labelled the "energy burden."

D. ENERGY BURDENS: THE MORE ACCURATE RELATIONSHIP.

A number of studies have found the relationship between consumption and payment problems to be somewhat more complex than a mere association between usage levels and nonpayment. It is not high energy *bills* which are associated with bill payment problems, a recent report in Kentucky found, for example, so much as it is high energy *burdens* (defined as bills as a percent of income). According to the Kentucky report, energy bills go down as income goes down. At the same time, however, energy burdens dramatically increase. According to this Kentucky study, not only do home energy burdens go up as arrears go up, but the converse is true as well (that arrears go up as home energy burdens go up).

In Jefferson County, Kentucky, the level of an energy bill, standing alone, was not a good indicator of whether households might face payment troubles with that bill. Household energy use, for example, declines as income declines. In Jefferson County, total energy consumption, as well as natural gas consumption, for households heating with natural gas looks like this:

**TABLE G:
ANNUAL TOTAL HOME ENERGY BILLS BY INCOME**

INCOME	TOTAL ENERGY BILL	NO. OF HHS
\$0-\$6,000:	\$915	2742
\$6,001-\$10,000:	\$1,037	935
\$10,000+	\$1,162	236

**TABLE H:
ANNUAL HOME NATURAL GAS BILLS BY INCOME**

INCOME	TOTAL ENERGY BILL	NO. OF HHS
\$0-\$6,000:	\$483	2742
\$6,001-\$10,000:	\$541	935
\$10,000+	\$587	236

Despite the lower bills by the lower income households, the *burden* that those bills impose on households is substantially greater. For the households reported immediately above, the burden of their total annual energy bills as a percent of income looks like this:¹³⁶⁾

**TABLE I:
HOME ENERGY BURDENS BY INCOME LEVEL**

INCOME	ANNUAL NATURAL GAS	ANNUAL TOTAL HOME ENERGY
\$0-\$6,000:	14%	27%
\$6,001-\$10,000:	7%	14%
\$10,000+	5%	10%

¹³⁶⁾This is before the receipt of LIHEAP.

These home energy burdens translate directly into energy payment problems. According to the Jefferson County report, there was a direct and substantial relationship between household arrears and household energy burdens. The report found that the size of the arrears is most associated with the energy burden as a percentage of income.

TABLE J:

ARREARS BY AVERAGE ENERGY BURDEN (PERCENT OF INCOME)					
BILL AS A PCT OF INC.	AVG PCT INCOME	AVERAGE INCOME	AVG. ANN. BILL	AVERAGE ARREARS	NO. OF HOUSEHOLDS
0 - 10%	8%	\$8,930	\$677	\$109	378
11 - 20%	15%	\$6,320	\$917	\$115	1,003
21 - 30	25%	\$4,485	\$1,091	\$121	684
31 - 50%	37%	\$3,382	\$1,231	\$138	408
51 - 100%	65%	\$2,132	\$1,332	\$149	118
100%+	N/A¹³⁷⁾	\$81	\$922	\$138	270

E. SUMMARY.

In sum, two conclusions can be drawn from the above analysis. When speaking of the offer of utility-financed energy conservation measures to low-income households, two different, but equally important, public policies are advanced. On the one hand, the need for utilities to offer least-cost service is apparent. This obligation is mandated by both statute and the common law. On the other hand, there is a need to seek remedies for low-income

¹³⁷⁾Since this range includes households with zero dollar incomes, a "percentage of income" cannot be calculated.

households whose energy bills represent an unaffordable burden upon household income. In those instances where household energy burdens are excessive, there is not only a social need to address the problem from the perspective of ensuring that no household member freezes to death, but there is a utility need to pursue every cost-effective measure to ensure that household bills are brought into affordable ranges.

The following analysis and proposal is made within this dual policy context.

III. SPECIAL LOW-INCOME CONSERVATION PROGRAMS CAN BE JUSTIFIED ON HISTORICAL REGULATORY GROUNDS.

Demand side management programs specifically targeted to low-income households can be justified on a number of grounds. First, due to market barriers that are unique to the poor, conservation programs designed for the "normal" residential population often "miss" the low-income household. As a result, these households end up paying for such programs while receiving none of the direct benefits of the programs. Second, low-income households present unique "avoided costs" to the utility that can be generated by conservation programs targeted to low-income households in particular. Each of these reasons will be discussed in more detail below.

A. LOW-INCOME MARKET BARRIERS.

The Massachusetts Department of Public Utilities (DPU) has in recent years turned its attention to discrimination in the offer of electric^{\38\} conservation programs.^{\39\} Programs offered by utilities in the Commonwealth, the DPU found, unreasonably discriminated against the poor. Exclusion of low-income households from receiving the "direct benefits" of conservation programs, the DPU decided, was "unacceptable."^{\40\}

^{\38\}There is no need to limit the analysis to electric programs. The programs which the DPU happened to be examining were electric.

^{\39\}See e.g., *Re. Western Massachusetts Electric Company*, 87 P.U.R.4th 306 (Mass. DPU 1987).

^{\40\}87 P.U.R.4th at 417.

The seminal case is *Re. Western Massachusetts Electric Company*.⁴¹ In that case, the Hampshire Community Action Commission (HCAC), a local community action agency, challenged both the overall conservation planning of Western Mass Electric Company (WMECO) and the design of specific conservation programs. Both the planning and design components, HCAC argued, were marred by assumptions which, though perhaps unwittingly, nevertheless resulted in the *effect* of excluding low-income households from conservation programs.⁴² This exclusion, HCAC said, not only denied the opportunity for the poor to reduce their bills by reducing their consumption,⁴³ but also resulted in the poor paying the costs of the conservation measures while receiving none of the benefits.⁴⁴

WMECO's energy conservation planning resulted in a *de facto* discrimination because of its failure to consider market barriers that were unique to the poor. Three barriers were discussed in particular. Hurdle rates, that annual return on investment required for a household to invest in conservation measures, were set at levels that ignored low-income data.⁴⁵

⁴¹ 87 P.U.R.4th 306 (Mass. DPU 1987); *see also*, *Re. Cambridge Electric Light Co.*, DPU-87-221-A, at 173 (Mass. DPU 1988).

⁴² "Although WMECO asserts that its programs are designed to be income neutral, HCAC contends that the effect of WMECO's programs, intended or unintended, is to exclude low-income customers." *Id.*, at 404.

⁴³ *Id.*, at 417.

⁴⁴ *Id.*, at 405. "It is HCAC's position that the exclusivity of the Company's programs has two undesirable results. First, it excludes low-income customers from the direct benefits of energy savings."

⁴⁵ *Id.*, at 404.

In its conservation planning, WMECO assumed that any measure which met a hurdle rate of 30 percent would be implemented without financial assistance from the utility. According to evidence presented by HCAC, however, low-income hurdle rates reached up to 90 percent. Second, HCAC said, low-income households do not have access to investment capital for conservation measures, even if those measures are recognized by customers as providing economic benefits. If a household does not have \$400 to invest in a new appliance, in other words, it makes no difference that the new appliance would return a savings of \$500 to the household. Finally, low-income households have less education, which interferes with their ability to recognize the cost savings that conservation measures might induce.

The Massachusetts DPU agreed that low-income customers of WMECO "receive few of the direct benefits of energy savings made available by Company-sponsored * * * programs."^{46\} Noting that low-income customers are "systematically excluded from participation" in WMECO conservation programs, the DPU found that by its actions and inactions, the utility "excludes a specific group of customers from enjoying the direct benefits" of those programs.^{47\} The remedy, the DPU said, was for the utility affirmatively to "take into account and compensate for market failures that affect any customer group's participation" in the company's conservation programs.^{48\} To

^{46\} *Id.*, at 417.

^{47\} 87 P.U.R.4th at 417.

^{48\} *Id.*

eliminate the *de facto* discrimination, the DPU said, "it is appropriate to use factors such as range of income levels, customer rate classes, or levels of electricity use to target a program to a specific group."⁴⁹

Eastern Edison Company,⁵⁰ too, was found to have a potential "bias in the selection process" for its conservation programs.⁵¹ The Department noted "the particularly limited scope of programs" in finding that Eastern Edison was, through its planning and implementation, effectively excluding "hard-to-reach residential customers such as low-income customers and tenants."⁵² In *Eastern Edison*, the Department found the lack of information to be a source of discrimination unto itself.⁵³ According to the DPU, "a company must have an adequate information base to determine the potential for [conservation] within each customer class."⁵⁴ To meet the directive that each utility must "take into account and compensate for market barriers that affect any customer group's participation in Company [conservation]

⁴⁹*Id.*, at 418.

⁵⁰*Re. Eastern Edison Company*, 100 P.U.R.4th 379 (Mass. DPU 1988).

⁵¹*Id.*, at 418.

⁵²*Id.* The DPU found that, other than a hot water insulation program, "the remaining programs target a very exclusive group of customers."

⁵³*Id.*, at 419. "Lack of information regarding the technical potential of [conservation] in the territory could be an additional source of bias in the process. Finally, the Company did not make any specific effort to consider the barriers to participating in [conservation] programs by certain residential and low-income customers."

⁵⁴*Id.*, at 419.

programs,¹⁵⁵ each utility in Massachusetts must now engage in a "systematic analysis" and must "document* * *consideration of program design to provide direct benefits to all customers including low-income and other residential customers."¹⁵⁶

For a utility effectively to design and offer conservation programs to its low-income customers, it should have a clear grasp of what market barriers prevent the implementation of those measures without utility assistance. The utility program, accordingly, would most rationally be designed to effect the removal of the identified market barriers. If, for example, the market barrier is an unreasonably long payback period, the utility may offer direct subsidies to shorten that period. If, in contrast, the market barrier is a lack of affordable investment capital, the utility may offer a low-interest/no-interest loan fund.

In 1987, the National Consumer Law Center (along with Northeast Utilities) put substantial effort into identifying what market barriers exist to the implementation of conservation measures by consumers. A list of the results of that effort is set forth below in Table K:

¹⁵⁵ *Id.*, quoting *Western Massachusetts Electric Co.*, *supra*.

¹⁵⁶ *Id.*

**TABLE K
RESIDENTIAL MARKET BARRIERS
TO IMPLEMENTING HOME ENERGY CONSERVATION MEASURES**

1.	<u>Information access.</u> Consumers do not have free access to information on capital/operating tradeoffs. There is an implicit cost in time and effort to obtain this information.
2.	<u>Uncertain technologies.</u> Consumers have little direct, first-hand experience with new technologies, particularly concerning performance, reliability and operating costs. Information may often be supplied by manufacturers whose credibility is suspect.
3.	<u>Consumer credit.</u> The ability to invest in conservation measures often depends on having access to credit. However, consumer credit is often limited by financial institutions that disregard the value of conservation investments.
4.	<u>Lack of knowledge.</u> Energy reductions are not always identifiable in the customer's bill. Accordingly, it is sometimes not possible for a customer to make a decision as to the economic viability of conservation programs.
5.	<u>Unfavorable payback periods.</u> Even though some conservation measures may be justified when viewed in light of systemwide savings, they may not be when viewed in terms of customer-specific savings.
6.	<u>High initial capital cost.</u> Even in the event that a measure is cost-justified in the long-term, if the initial capital cost exceeds the ability of a customer to finance, the program will not be implemented.
7.	<u>Difficult installation.</u> Just as there are implicit costs in time and effort to obtain conservation information, there are implicit costs of installation. As these costs go up, the extent of measures installed will go down.
8.	<u>Limited or no commercial availability.</u> Even if cost-effective, some demand side measures have a limited (or no) commercial availability to a utility's customers. Often, availability will follow demand, but demand, in turn, is dependent upon availability.

In addition to market barriers common to all residential ratepayers, however, low-income households have market barriers that are different from, and more extensive than, residential households in general. The result of these market barriers is to more severely restrict the availability of conservation measures to low-income households than to residential households in general. A list of market barriers that make the direct benefits of conservation programs inaccessible to low-income households is set forth below in Table L.

To illustrate the meaning of the term "market barriers," three in particular are discussed below: (1) discount rates/payback periods; (2) liquidity; and (3) tenancy.

A. DISCOUNT RATES: Low-income households tend to have extremely high implicit discount rates (also sometimes known as hurdle rates or internal rates of return). A recent study for Northeast Utilities found that up to 90 percent of households in the service territories of its electric utilities required paybacks of less than one year. More generally, a report for the Electric

TABLE L
LOW-INCOME MARKET BARRIERS
TO IMPLEMENTING HOME ENERGY CONSERVATION MEASURES

1.	Low income homeowners are reluctant to borrow, even interest-free, to invest in conservation.
2.	Low income homeowners have extremely high required returns on investment.
3.	Given their lack of liquidity, low income residents cannot hire a contractor as readily as those with greater means.
4.	Tenants have little or no incentive to improve the landlord's property.
5.	Tenants often have insufficient tenure at a particular service address to cost-justify conservation improvements.
6.	Landlords owning housing occupied by tenants whose electricity use is individually metered have little incentive to invest in conservation improvements.
7.	Lower income households generally have less education than higher income households and, as a result, are perhaps less aware of the cost savings that energy investments can produce. The lack of education could also make it more difficult to perform the calculations necessary to determine whether a conservation investment is advantageous.

Power Research Institute (EPRI) found that the implicit discount rate for low-income households¹⁵⁷⁾ ranged up to the 80 - 90 percent level. For residential households in general, however, the hurdle rate for conservation investments is 30 percent; that translates into a payback period of roughly three years. To the extent that a utility conservation program thus strives to bring a conservation

¹⁵⁷⁾ Cambridge Systematics, *Implicit Discount Rates and Consumer Efficiency Choices* (1986).

investment only within the 30-percent range, it excludes by implication all households which have a higher hurdle rate. One entire category of excluded households consists of low-income households.

B. LIQUIDITY: Low-income households tend to have extremely low liquidity.

In these circumstances, the payback period for any particular conservation measure becomes irrelevant if the household does not have the investment capital with which to begin. The impact of this market barrier, for example, is often ignored in the reliance on appliance rebate programs. Such a program may pay the incremental cost of moving a customer from the purchase of a less energy efficient new refrigerator to a more energy efficient new refrigerator. In such a program, if the less efficient refrigerator costs \$600 and the more efficient refrigerator costs \$700, it may well be cost-effective for the utility to pay the \$100 difference to prompt the purchase of the more efficient appliance. This program, however, will automatically exclude households that are not in the market to purchase new refrigerators with which to begin. It is axiomatic to note that not many low-income households recently spent \$600 for a new refrigerator.

C. TENANCY: Low-income households tend to live in rental dwellings.

Research by NCLC in a variety of states has found, for example, that from 60 - 75 percent of all LIHEAP recipients tend to be tenants. This finding has significance in two respects for the design of conservation programs. First, tenants have little or no incentive to improve the landlord's property. They do not receive any of the increased value of the property and, in fact, may face rent hikes as a result of the improvements. Second, these low-income tenants tend to be more mobile. Research by the National Social Science and Law Center (NSSLIC), for example, found, for example, that compared to the roughly twelve percent of the total population that changed residences each year, nearly one-quarter (23) percent of the low-income population moved. Disproportionately represented in the "mover" households are recipients of public assistance, minorities, and female-headed households. As a result, even in those instances where a tenant may wish to invest in a conservation measure, and assuming a financial ability (e.g., sufficient liquidity) to do so, the payback period required to justify such an investment would need to match the household's tenure. A low-income household, in other words, will not invest in a measure with a two-year payback if that household tends to move to a different dwelling every 12 months.

There are serious impacts of failing to recognize and affirmatively compensate for the market barriers that are unique to the poor in the offer of utility-sponsored conservation measures. More particularly, distributional inequities arise; in effect, without compensating for these market barriers, a utility would have created an income transfer in the wrong direction.

B. DISTRIBUTIONAL IMPACTS OF EXCLUDING THE POOR.

In the event that utilities do not recognize and act upon these low-income market barriers, the poor tend to pay for utility-financed conservation programs while gaining none of the direct benefits of the programs. In addition to the Massachusetts decisions, the Colorado Public Utility Commission recently held that Colorado's utilities must design energy conservation programs to be made available specifically for low-income households. According to the Colorado Commission, "no cost-effective measure should be discarded solely because of its differential effect on ratepayer classes." The order came in the Colorado PUC's docket titled *Generic Inquiry Concerning Demand Side Management Issues*.^{158\}

In deciding that utilities must design and implement specific low-income programs, rather than simply assuming low-income participation in general residential programs, the Colorado PUC said that "we essentially agree with the following language from (the document titled) *A Regulatory Response to*

^{158\} Docket No. 90I-227EG, Policy Statement (issued December 1990)

Low-Income Energy Needs in Colorado,^{159\} prepared by the National Consumer Law Center." According to that NCLC analysis, filed with the PUC on behalf of Legal Aid of Metro Denver:

When some households pay all or part of the costs of a DSM (Demand Side Management) measure but, due to the nature of the capturing and distributing the benefits, receive none of those benefits, a distribution problem arises. (footnote omitted). This result has particular implications for low-income households. Assume for the moment that low-income households tend to be non-participants in utility-financed conservation programs.* * *If that is true, when a utility uses ratepayer money to finance DSM measures, there is a direct income transfer from low-income households to households with moderate and upper incomes. The income transfer from an equity viewpoint is clearly in the wrong direction.

The Colorado PUC continued on to quote the NCLC analysis, which stated:

^{159\}This analysis is dated September 27, 1990.

This is not to say that DSM programs are to be avoided if rates increase on a per unit basis as a result.

Notwithstanding this result, all DSM programs which are cost-effective, as measured by a reduction in total revenue requirements, should be implemented. The equity issues do not involve the question of whether a cost-effective program should be pursued. Rather, they involve how best to capture and distribute the costs and savings of such a program.

The PUC concluded, quoting the NCLC report:

Nevertheless, the offer of cost-effective DSM programs raises new and unique issues regarding the recognition and distribution of costs and benefits of particular utility programs. Because of those new distribution issues, *special efforts must be made to protect the poor.* (emphasis added by PUC). Without those special efforts to recognize and redress the distributional issues raised by DSM programs, those programs may have adverse (and unintended) consequences for low-income households, consequences that can be avoided.

In order to understand this line of reasoning, it is important first to understand the nature of the distributional questions at issue. As mentioned above, a conservation measure is cost-effective if it results in lower total revenue requirements to a utility. The cost which is avoided by implementing the conservation measure is a systemwide benefit and, at least in theory, inures to the benefit of all ratepayers. This is true even though each specific conservation measure is installed in a particular individual's home or in a particular factory, school or commercial business. Despite the individual nature of the placement of the measure, the measure represents a systemwide investment in providing adequate service at least-cost and the savings represent a systemwide savings.

Notwithstanding the theory of systemwide savings, in practice, it is administratively difficult to capture and distribute the savings generated by any given conservation measure on a systemwide basis. Instead, as a general rule, while all ratepayers on the system contribute to the cost of the measure, the savings are captured by the individual in whose home or factory or commercial establishment the measure is installed. Again it is simple to illustrate:

The revenue requirement for Utility A is \$500, paid by each of five ratepayers who each pay \$100 for 1000 KWH. The utility, the "agent" for the ratepayers as a group, determines that an investment of \$30 in new, more efficient lighting for Ratepayer 1 will reduce system costs by \$40.

The investment is cost-effective for the ratepayers as a group if the reduction in the utility's revenue requirement is reduced more than the cost of effecting the reduction. Here the total costs to serve all ratepayers before the program is \$500 reduced to \$460 (\$500 less the \$40 saving). Adding back in the \$30 cost of the program, the net total cost after the program is thus \$490. Since the total cost of serving all ratepayers has been reduced after the cost of the program is considered, the program is cost-effective from an economic standpoint taking the group of all ratepayers, i.e., "the system," as the unit of analysis. The system spent \$30 to save \$40.

The distributional question is raised by the mechanism used to capture and distribute these conservation costs and savings. The following Illustration again uses this example to exemplify the process. As can be seen in this Illustration, all ratepayers contributed to the \$30 fund. Each was charged a pro rata portion of the costs of the conservation program. On a per KWH basis, the conservation program cost 6.52 cents ($\$30/4600$ KWH). Not all ratepayers, however, shared in the \$40 in benefits. In fact, in this example, the savings were allowed to inure solely to the benefit of the person in whose home the conservation measure was installed. In other words, Ratepayer 1 saved \$40 because the new lights reduced her bill by that amount. She was charged her share of the \$30 (600 KWH \times $\$0.0652/\text{KWH} = \3.92) but received the entire \$40 benefit for a net savings of \$36.08. Each of the nine

non-participating ratepayers also contributed their pro rata share to the \$30 for the program (1000 KWH x \$0.0652 = \$6.52), but received no share of the \$40 savings.

Distributional Problems Bills After Implementation of Conservation Measure

RATEPAYER 1:	
Usage:	600 KWH
Price for production:	\$0.10/KWH
Price for conservation measure:	\$0.0652/KWH*
Total bill:	\$63.91**
RATEPAYER 2:	
Usage:	1000 KWH
Price for production:	\$0.10/KWH
Price for conservation measure:	\$0.0652/KWH
Total bill:	\$106.52***
RATEPAYER 3:	
Usage:	1000 KWH
Price for production:	\$0.10/KWH
Price for conservation measure:	\$0.0652/KWH
Total bill:	\$106.52***
RATEPAYER 4:	
Usage:	1000 KWH
Price for production:	\$0.10/KWH
Price for conservation measure:	\$0.0652/KWH
Total bill:	\$106.52***
RATEPAYER 5:	
Usage:	1000 KWH
Price for production:	\$0.10/KWH
Price for conservation measure:	\$0.0652/KWH
Total bill:	\$106.52***

TOTAL COMPANY REVENUE REQUIREMENT:	\$490
TOTAL PRODUCTION:	4600 KWH
AVG. PRICE PER KWH:	10.562 cents
NOTES: * $\$30$ divided by 4,600 KWH = $\$0.0652$ per KWH ** $(600 \text{ KWH} \times \$0.10/\text{KWH}) + (600 \text{ KWH} \times \$0.0652/\text{KWH}) = \$63.91$ *** $(1000 \text{ KWH} \times \$0.10/\text{KWH}) + (1000 \text{ KWH} \times \$0.0652/\text{KWH}) = \$106.52$	

These concerns are of particular importance to the low-income community. As discussed in detail above, low-income households inherently tend to be non-participants in utility-financed conservation programs. Accordingly, even though the savings generated by conservation measures are "system" benefits, and even though the low-income ratepayers are paying "their share" of the costs, they are systematically excluded from receiving "their share" of the benefits.

Before addressing how to address this problem, however, it is important to understand what the problem is *not*. The problem is *not* a system planning issue. From a system planning perspective, there is no question but that the program is cost-effective and should be implemented. Total revenue requirements decrease.

The problem identified in this discussion is a cost allocation issue. And, whenever cost allocation questions arise, it would seem that the issue under discussion is rate design. Before placing a label on it, however, it is necessary to examine what is happening in concept. The issue which arises is distributional in nature: that is, how best can the costs of conservation

measures be assigned and the benefits from conservation measures be collected and distributed. The means identified in the example (i.e., to have the costs distributed on a per KWH basis and have the benefits flow directly to the ratepayer in whose home or factory the conservation measure is installed) is certainly one way to distribute the benefits and the costs, but there are other ways as well. For example, each ratepayer might contribute her share of the program costs ($\$30/4600 \text{ KWH} = \$0.0652/\text{KWH}$) and receive in exchange her share of the program benefits ($\$40/4600 \text{ KWH} = \$0.087/\text{KWH}$). This is a means to address the distributional problem through a rate design mechanism.

While addressing the distributional problem in this manner might be more satisfying in principle as a way to distribute benefits and costs, it would be more difficult to administer since there would have to be a mechanism for extracting from the directly benefitting ratepayer the benefits which should be shared among the group on a more or less *pro rata* basis. Again, the question is not whether adequate systemwide benefits exist so as to justify undertaking the conservation measure. The question is how best to capture and distribute those benefits.^{60\}

^{60\}This is how it differs from a "no-loser's" test. A "no-loser's" analysis says that a program is not cost-effective if it is possible for rates to increase to non-participants. As is shown in the Illustration, however, so long as the cost of the conservation measure is less than the cost of the supply-side measure, the only reason that rates to some might go up is because of the means used to capture and distribute the savings. Using a different means of distributing the savings ensures that everyone gets "their share" of the more than ample benefits. If anything, this evaluation shows the fallacy in a "no-loser's" analysis.

A simple alternative to the rate design solution is for the utility simply to make special efforts to ensure that all populations have conservation programs designed to be within their grasp such that the direct benefits of conservation measures flow even to populations which, by the very nature of the characteristic defining the population (e.g., poverty), would be excluded from participating in "ordinary" conservation programs. If, in other words, a poor household would by the very fact of its poverty be systematically excluded from a utility's ordinary conservation programs, the utility should make special efforts to offer special programs designed to overcome that exclusion.

This is not to say that special efforts be made to ensure that each conservation program offer some benefits to each ratepayer. However, in order to redress the distributional issues discussed above, the portfolio of conservation programs when viewed as a whole must offer the opportunity to all willing ratepayers, including the poor, to gain the direct benefits of conservation.

IV. LOW-INCOME AVOIDED COSTS.

In addition to the equity analysis regarding conservation programs targeted specifically to low-income households, it is possible to justify such programs on the basis of the expanded avoided costs that are available through such targeted measures. These costs will be referred to, for the purposes of this analysis, as "bad debt" costs.^{61\} Bad debt arises when ratepayers demand power from the system and then do not pay for it on a timely basis. The system incurs the costs of production and delivery of power as well as billing and collection costs. If those costs are not paid by the delinquent ratepayers, then they must be borne by other ratepayers.

If the system losses due to bad debts could be reduced through the expenditure of a lesser amount of money, this could be cost-effective. So, for example, assume that a utility could spend on a one-time basis \$1,000 on a Bad Debt Program and reduce bad debts by \$2,000 per year for ten years. At a discount rate of 12.5 percent, the net present value savings stemming from the investment would be roughly \$10,000. This is clearly a "good investment" for the system in that it leaves all ratepayers better off than they would otherwise have been.

^{61\}This is concededly somewhat of a misnomer. The term "bad debt" is not used here in its typical sense. Rather, these costs are defined to include credit and collection expenses, working capital, and other expenses associated with late payments, partial payments and nonpayments.

This analysis thus fits neatly into the definition of avoided costs set forth above. Bad debt is an avoidable cost to the system just as energy and capacity costs are. To the extent that conservation measures can help reduce bad debt expense, those reduced expenses should be included in the calculus of "avoided costs."

Accordingly, under the principle of cost-effective planning, a utility should invest in conservation measures that cost less than the costs they are designed to avoid. Traditional avoided cost analysis looks at such items as production, transmission and distribution costs. However, it is clear that some customers impose a cost on the system ratepayers in general that is beyond the production, transmission and distribution costs. Bad debts are a cost of service and raise rates to all ratepayers just as new plant and associated investment. To the extent that bad debt can be reduced, therefore, there will be systemwide savings which inure to the benefit of all ratepayers.

In addition to the savings which arise by the reduction of revenues foregone through bad debt, there will be savings in reduced collection costs. There will also be reduced working capital requirements as a result of the reduction of the "lag" in collecting bills. Accordingly, a utility can target some additional conservation measures to payment troubled customers, which measures may not have found their way into the mix under an evaluation system that did not consider the enhanced system benefits of dealing with the bad debt problem through conservation measures. Measures would be

offered to cost-effectively reduce the consumption of these firms and households to the extent that the bills rendered to the consuming entity would be affordable and thus within the ability of the ratepayer to pay in a timely and complete fashion.

It is important to remember, however, that while the program may result in targeting additional conservation measures to low-income households, the purpose of the program is not to provide a subsidy but to achieve system savings and cost reductions to ratepayers in general. So long as the program is cost-effective in reducing system costs, as defined in terms of lowered revenue requirements, it makes no difference who individually might benefit. At all times, the level of expenditure would depend on what is cost-effective to spend. A utility should keep spending until the marginal cost equals the marginal savings.

Moreover, measures provided using this analysis should be tied to eliminating market barriers to the implementation of conservation measures by those customers. Thus, for example, unfavorable payback periods and an unwillingness to borrow would need to be addressed by direct investment programs; the lack of investment capital could possibly be addressed by low-interest and no-interest loan programs.

Some utilities are beginning to capitalize on this recognition of the expanded avoided costs associated with conservation programs targeted to

payment troubled households. Wisconsin Gas Company, for example, has implemented a pilot program explicitly designed to use conservation measures as a means to reduce the costs associated with delinquent payments and bad debt. The purpose of the study, Wisconsin Gas said, was "to examine the effects of Wisconsin Gas Company's Weatherization Program on the arrearages of low-income customers."^{162\} Wisconsin Gas divided its study homes into two groups: (a) single family homes; and (b) two-family homes.^{163\}

For single family homes, Wisconsin Gas experienced an overall therm savings of 23.4 percent.^{164\} Moreover, therm savings based on heat load were computed. The company produced "an overall single family heat load savings rate of 30.7 percent* * *."^{165\} Two-family homes generated similar results.^{166\}

Wisconsin Gas found that not only did the program reduce arrears for households, but the company recognized significant savings from the program as well. According to the company, without the program, while only nine percent of the study group would have had arrears of \$100 or less without the

^{162\}See, *Weatherization Arrears Savings, Wisconsin Gas Company (April 1988)*.

^{163\}The company stated, however, that "due to the integrated nature of two-family energy use and weatherization measures, two-family accounts were treated as one dwelling unit." *Id.*, at 1.

^{164\}While the savings ranged widely between units, the company noted that 64 percent of the single family homes fell in the 10 percent to 35 percent savings range. *Id.*, at 2.

^{165\}*Id.* Again, while the savings ranged widely between units, 60.2 percent of the single family homes fell in a range of 25 percent to 50 percent savings.

^{166\}*Id.*, at 5. Over 70 percent of the dwellings fell in the 10 percent to 35 percent savings range.

program, 27 percent of the group would have annual arrears of \$100 or less following weatherization.¹⁶⁷ Moreover, Wisconsin Gas found that it received a 20 percent return on its weatherization investment, strictly from the reduced nonpayment, and before considering traditional avoided costs, in the first year of the program.

In sum, Wisconsin Gas concluded from its study:

The study indicates that single family dwellings generated on average \$353 less **annual** arrears after weatherization. (emphasis added). For the two family group, weatherization reduced arrears \$502 **annually**. (emphasis added). Taken a step further, for 1,300 dwellings weatherized annually and split evenly between single and two-family jobs, over \$550,000 in billed arrears or approximately \$360,000 in gas cost would have been avoided.¹⁶⁸

Finally, Wisconsin Gas concluded, "within the parameters of this study, 20 percent of the study group would have generated \$0 or less annual arrears

¹⁶⁷Id., at 2.

¹⁶⁸Id., at 6.

with weatherization as compared to 5 percent without. This reflects favorably on weatherization potential as an arrears eliminator.⁶⁹ A copy of the Wisconsin Gas report is attached as Appendix A.

Similar results can be obtained for electric companies. One *electric* company in Massachusetts, for example, has considered an arrears control program using conservation as the mechanism. COM/Electric found that "from the analysis, a Bad Debt Program appears to be not only theoretically sound, but also empirically supported for electrically heated homes and for homes having electric water heaters. It also appears beneficial to offer the program to 'other' homes in the Commonwealth service territory."⁷⁰ According to SRC, "the main source of economic value to COM/Electric is the reduced carrying costs for late payments."⁷¹

SRC found for COM/Electric that the Bad Debt Conservation program had, from a system perspective (i.e., based upon system "avoided cost" savings), a benefit-cost ratio of 1.857 (for electrically heated homes), of 2.290 (for homes with electric hot water but not electric heat), and 1.944 (for all "other" --non-electric heat, non-electric hot water-- homes).

⁶⁹ *Id.*

⁷⁰ Synergic Resources Corporation, *Evaluation of the Cost-Effectiveness of a Bad Debt Conservation Program: Final Report* (September 1988).

⁷¹ SRC did not study collection costs.

V. INCREASED CONTRIBUTION.

Conservation is particularly effective in controlling costs when used in combination with special low-income utility rate programs such as the Philadelphia Gas Works Energy Assurance Program (EAP). Indeed, households participating in such programs should be targeted for special conservation programs.

Under the EAP, participants pay a designated percent of their income toward their gas bills. The LIHEAP program also makes a contribution to those bills, the amount of which is ultimately limited by state and federal contributions to LIHEAP. A portion of the fully-embedded cost of providing a household service is covered by neither the household's payment nor by LIHEAP assistance. An explanation of EAPs is set forth in Appendix B.

For any individual EAP household, in other words, the household's payments and LIHEAP benefits do not fully cover the utility's fixed costs. Since the EAP payment remains constant, for each dollar reduction of variable costs, a greater contribution toward fixed costs is obtained. A reduction in usage reduces the costs of providing service to EAP customers and inures to the benefit of the utility's other customers. While it is true that the EAP participant may receive the benefit of increased comfort due to any conservation programs directed toward EAP participants, the real recipient of the benefits of such conservation programs are the other ratepayers. After all,

the EAP participant's payment is a function of her income and thus remains the same even if the household's energy usage decreases.

It is easy to see why conservation programs directed toward EAP participants provide particular benefits to the sponsoring utility. Assume that an EAP customer pays five percent (5%) of her annual income of \$7,000 (\$350) toward her utility bill. Further assume that the average EAP usage is 10 Mcf per month and that the fully embedded cost of serving EAP customers is \$5.00 per Mcf. Of this, assume that \$3.00 covers variable costs and \$2.00 covers the company's fixed costs.

If the customer were billed for the fully embedded cost of service, the customer would be asked to pay a total of \$600 per year, \$360 of which would represent variable costs and \$240 of which would represent fixed costs. The difference between the EAP customer's payment and the fully-embedded cost of service is as follows:

**TABLE M
EAP FIXED COST CONTRIBUTION WITHOUT CONSERVATION**

	EAP PAYMENT	FULLY-EMBEDDED COST	DIFFERENCE
TOTAL:	\$350	\$600	\$250

If the utility-sponsored conservation reduced the usage of the customer by 20 percent to 8 Mcf per month, the difference between the EAP customer's payment and the fully-embedded cost-of-service would shrink:

**TABLE N
EAP FIXED COST CONTRIBUTION WITH CONSERVATION**

	EAP PAYMENT	FULLY-EMBEDDED COST	DIFFERENCE
TOTAL:	\$350	\$480	\$130

Not only does conservation result in a reduction in the difference between the EAP payment and the fully-embedded cost of service by \$200, but it results in an increase of that portion of the EAP customer's payment that will go to fixed costs.

**TABLE O
INCREASED EAP FIXED COST CONTRIBUTION
WITH CONSERVATION VS. WITHOUT CONSERVATION**

	EAP PAYMENT	VARIABLE COSTS	FIXED COST CONTRIBUTION
PRE-CONSERVATION	\$350	\$360	(\$10)
POST-CONSERVATION	\$350	\$288	\$62

Thus, conservation and other conservation measures targeted to EAP customers has the added benefit of reducing the share of fixed costs other ratepayers must pay. An EAP program combined with an aggressive conservation investment program directed at EAP participants would yield significant benefits to participating utilities.

VI. LOW-INCOME NONPARTICIPATION IN CONSERVATION PROGRAMS.

Low-income households frequently do not participate even in publicly funded conservation programs aimed at reducing their energy bills to more affordable levels. Understanding the reasons for such nonparticipation, and developing responses, can play a key role in making conservation and weatherization assistance available. Research has been directed toward why households do not participate in public assistance programs. That research is summarized below and conclusions drawn for purposes of low-income conservation and weatherization.

One reason low-income households do not participate in public benefit programs is due to a lack of "effective knowledge" about such programs. One Pennsylvania study, for example, found this lack within the low-income fuel assistance program (LIHEAP). The Pennsylvania research found that there has been a substantial increase in consumer awareness of energy assistance programs since 1981. The proportion of consumers who are aware of the existence of an energy assistance program and can name a specific program nearly doubled from 1981 (26%) to 1985 (46%). The results are summarized below:

**TABLE P
AWARENESS OF ENERGY ASSISTANCE IN PENNSYLVANIA**

AWARENESS	1981 (%)	1985 (%)
Unaware of	47	14

Energy Assistance:		
Aware but could not Provide Name:	27	40
Aware and Did Provide Some Name:	26	46
N=	460	500

These Pennsylvania figures can be seen from the converse side, however. The Penn State study found that "while most consumers indicate awareness of energy assistance, in general, their knowledge is not sufficient to allow them to act. Almost half of those who say they 'know about' energy assistance cannot name a single program."^{72\} As can be seen from the above Table, fifty-four percent are either aware of energy assistance but cannot name a specific program or are unaware of any programs in 1985.^{73\} The Penn State report concludes:

While the level of awareness has improved considerably in recent years, these findings raise questions about the uninformed majority. People who are unaware of programs or cannot name an agency which they can contact for assistance most likely do not have effective access to help when they need it.^{74\}

^{72\}Id., at 22.

^{73\}The knowledge problem is receding somewhat, however. This figure is down from 74 percent in 1981.

^{74\}Id., at 22.

The Penn State report made several findings, including:
oConsumer knowledge of the existence of energy assistance and conservation programs "is not very extensive. * * *Most consumers do not have effective knowledge about those programs which exist."^{175\}

olt is the responsibility of the Public Utility Commission, the Pennsylvania Department of Public Welfare, and utility companies to inform payment-troubled customers of their options and possible sources of assistance.

olt is not possible, however, for state agencies or public utility companies to "require" consumers to use information nor can they force consumers to apply for assistance.

oThe low level of knowledge about the various options available to consumers raises a question as to whether some consumers are being denied access to the assistance network because their knowledge is incomplete.

^{175\}Id., at 27 - 28.

oConsumer education can fill in the missing gaps in consumer knowledge and teach consumers to use the information available to them in an effective manner.

The concept of advancing "effective knowledge" on the part of consumers is one contribution the Pennsylvania research has made to developing appropriate outreach. "Effective knowledge" involves not only conveying information, but teaching consumers how to use that information as well. According to the Pennsylvania work, consumers must know how to act upon the information they are given.

A second reason why some households do not participate in low-income assistance programs is because they mistakenly believe they are not eligible for such programs. For example, most *elderly* poor in New York did not know of, and did not use, the existing energy "intervention programs" designed for their benefit.^{176\} Noting that "no intervention program can be effective unless it is known and used," the New York study sought to determine "the degree to

^{176\}A January 1978 report identified three programs that existed at that time: (1) the Special Crisis Intervention Program (SCIP) funded by the Community Services Administration and administered through the New York State Department of Social Services (aimed at elderly homeowners); (2) the Supplemental Security Income (SSI) Emergency Assistance for Adults, a program aimed at resolving, *inter alia*, energy emergencies for SSI recipients; and (3) the Community Services Administration Weatherization Program funded by CSA and administered by the New York State Department of State (aimed at low-income homeowners with poorly insulated homes).

which (the sample of elders studied) was aware of and utilized these programs."^{177\}

The Unseld report found that "fewer than 20% of the sample were aware of the SCIP^{178\} or weatherization programs."^{179\} On the one hand, the study explained the low SCIP participation, notwithstanding "intensive outreach and heavy media advertising," by noting the "brief time available for advertising and implementing the program." On the other hand, the study noted simply that "the CSA weatherization program *a/so* had relatively low visibility despite extensive advertising and outreach campaigns."^{180\}

The report expressed surprise at the "low degree of knowledge" of the energy assistance programs, "given our relatively informed and active sample, most of whom had had contacts with senior centers." It concluded that "any programs directed at this population must be accompanied by specialized, skillful advertising and outreach in order to be effective."^{181\}

^{177\}Charles Unseld, *The Impact of Rising Energy Costs on the Elderly Poor in New York State*, at 61, prepared by Welfare Research, Inc. for the New York State Energy Office (January 1978).

^{178\}SCIP is the special crisis intervention program.

^{179\}*Id.*, at 62.

^{180\}*Id.*, at 62.

^{181\}*Id.*, at 62.

The New York study examined why households in the senior citizen sample did not use the existing energy weatherization program. Those reasons are set forth below:

TABLE Q
RESPONDENTS' REASONS FOR NOT USING
EXISTING ENERGY ASSISTANCE PROGRAMS (BY %)¹⁸²¹

REASONS	WEATHERIZATION
NOT ELIGIBLE, NOT QUALIFIED	24.2
TOO PROUD	4.8
DIDN'T KNOW HOW TO APPLY	4.8
NUISANCE	1.6
DIDN'T THINK IT APPLIED TO ME	17.7
OTHER	22.6

The New York report looked in particular at the attitudes of the elderly toward energy assistance.¹⁸³¹ The study reported two "separate but related phenomenon" regarding the elderly: (1) substantial numbers of the elderly poor perceive themselves as ineligible for such programs; and (2) a sizable minority appear to attach a stigma to the use of any government "hand-outs." The report concludes as to the elderly:

It is quite likely that both of these attitudes derive from the fact that the elderly poor have frequently *become* poor with age. (emphasis in original). The newly poor

¹⁸²¹Represents percentage of these individuals who had heard about but did not use the programs (SCIP N=54; SSI-EEA N=160; Weatherization N=67).

¹⁸³¹Id., at 66.

have a long history of self-reliance and independence and quite often take pains to distinguish themselves from the welfare population. Programs that appear to present 'something for nothing' are difficult for many of them to accept. It appears, too, that many elderly perceive these programs as 'welfare' and thus as inappropriate for them --despite acknowledged need.^{184\}

Identifying households who have "become poor" as populations in need of special outreach, identifying the advantages of tying energy assistance to programs addressing other needs also, and identifying media advertising as being inadequate unto itself as a means of outreach are all lessons to be learned from the New York elderly energy assistance study effort.

Difficulties in entering a program for the first time represent a third reason why households may not participate in low-income weatherization programs. In addition, the offer of low-income energy assistance must be aware of the frequency of persons with limited education who will seek to participate in such a program. A Vermont study of Food Stamp participation and nonparticipation can be instructively reviewed in this regard.^{185\}

^{184\} *Id.*, at 66 - 67.

^{185\} Sandage Advertising & Marketing, *Food Stamp Program: Focus Group Research Report*, at 6, prepared for Vermont Department of Social Welfare (1989).

Failing to account for these factors may prevent program participation. For example, the application forms for the Food Stamp program in Vermont were a major barrier to participation. The participants, according to the Vermont researchers, "viewed the 12-page application form as complex and overwhelming."^{186\} The report continued:

there were several participants* * *in particular who were very open about their lack of education (4th grade or less), and their inability to complete the forms without assistance. Regardless of educational level, however, the participants felt the instructions were not clear and that the wording of several questions on the application form was confusing.^{187\}

Providers of conservation and weatherization assistance must be particularly sensitive to the needs of the first time participant. For example, the Vermont Food Stamp report found, "there were several participants who mentioned that *the first time* (emphasis in original) the monthly reporting form arrived in the mail, they had been confused about what was expected."^{188\}

^{186\} *Id.*, at 8.

^{187\} *Id.*, at 8.

^{188\} *Id.*, at 7

Moreover, according to the Vermont report, "a lack of knowledge about how or where to get problems resolved had resulted in several families losing their eligibility."^{189\}

Finally, a lack of trust in programs, or in providers, serves as a substantial barrier to participation in weatherization and conservation programs. A recent national study by the Center on Budget and Policy Priorities examined specifically why elderly households did not participate in the LIHEAP program.^{190\} While the study found the reluctance of elderly households to accept what are perceived to be public welfare payments to be a significant barrier to participate,^{191\} the report noted other substantial barriers to participation as well. One major barrier, the Center said, was a lack of program trust. A study of methods for marketing energy conservation programs to the elderly, this report noted, found that "many of the elderly did not *trust* the programs." (emphasis added).^{192\} Some seniors, the report noted, "were reluctant to accept weatherization assistance because of previous experiences with fraudulent home repair organizations."^{193\} The report found

^{189\} *Id.*, at 7.

^{190\} Kathryn Porter, *Participation by the Elderly in the Low Income Home Energy Assistance Program*, prepared by Center on Budget and Policy Priorities for the American Association of Retired Persons (AARP) (December 1989).

^{191\} *Id.*, at 26.

^{192\} *Id.*, at 26, citing Linda Berry, et al., *Marketing and Design of Residential Conservation Programs for the Elderly*, Oak Ridge Laboratories (February 1988).

^{193\} *Id.*

that in designing outreach efforts, "the specific informational techniques used were less important than the amount of trust potential participants had in the sponsoring organization."⁹⁴

In each of these instances, the particular reason for nonparticipation interferes with each of the goals of providing low-income conservation and weatherization. The households suffer as a result of paying more than necessary, or affordable, for home energy services. The utilities suffer as a result of being unable to eliminate inefficient energy use on their systems. The state suffers as a result of devoting scarce fuel assistance dollars to pay for unnecessary, and wasteful, energy consumption. Society suffers as a result of the depletion of scarce natural resources and the consumption of polluting fuels.

In each instance, however, specific actions can be taken to overcome these reasons for nonparticipation. A proposal is included below for utilities to recognize these reasons directly and to design strategies through which such nonparticipation can be overcome.

⁹⁴Id., at 29 and 30.

VII. PROPOSALS.

Based on the above discussion, the following recommendations are made for low-income conservation and weatherization programs:

1. **OUTREACH PROGRAM:** Utilities should initiate a conservation targeting program aimed at low-income households with the highest energy burdens. Public utilities and state LIHEAP offices should develop cooperative programs through which such households can be identified. Priorities for both publicly and privately financed programs should be set starting with those households devoting the highest percentage of their income toward their home energy bill. Any determination of whether particular measures to be offered are "cost-effective" should consider not only traditional avoided costs, but should consider the avoidable costs associated with foregone credit and collection activities, foregone bad debt and working capital, foregone arrears and the like.

2. **WISCONSIN GAS ARREARS REDUCTION PROGRAM:** Public utilities should seek to duplicate the success of the Wisconsin Gas and Commonwealth Electric arrearage reduction programs. Income eligible households with high arrears should be identified and offered conservation and weatherization measures. The participating utilities should track, as did Wisconsin Gas, the

reduction of arrears arising from the installation of such measures. Moreover, the participating utilities should track, as did Commonwealth Electric, the reduction in carrying costs associated with the reduction in arrears. Conservation and weatherization measures offered under such a program should include measures directed toward primary space heating sources as well as measures directed toward non-space heating and non-water heating appliances.

3. MARKET BARRIER IDENTIFICATION AND REDRESS: Public utilities should undertake research to identify those market barriers which prevent low-income households in their service territories from implementing cost-effective conservation and weatherization measures. A report of such findings should be presented to the state public utility commission along with a work plan indicating the precise programs designed to overcome each identified barrier. Any determination of whether particular conservation and weatherization measures are cost-effective should include a calculation not only of traditional avoided costs, but should include avoided credit and collection costs, avoided bad debt and working capital costs, and the like.

4. COMMUNITY-BASED SUPPORT: Each utility should, as one of its low-income conservation and weatherization strategies, contract

with a community-based organization to deliver measures found to be cost-effective using the expanded concept of "avoided costs" discussed throughout this analysis. The utility should monitor the low-income households' perceptions of such supported community-based organizations to determine whether populations are being reached that have not historically been reached by utility-based efforts. Special consideration should be given to those community organizations that reach specific target audiences (e.g., the elderly, minorities) in a unique fashion.

5. Outreach: Public utilities should be directed to use their own accounting data processing records to identify payment-troubled customers. These customers should receive specific targeted outreach from the utilities promoting participation in the LIHEAP program.

6. Outreach: Public utilities should be directed to assist Community Action Agencies, the state, and other interested parties, in the development of weatherization outreach that is both "specialized" and "targeted." Specialized outreach directed toward the senior population is necessary, as is specialized outreach to the unemployed, to the recipients of public assistance (such as AFDC population) and the like.

7. Targeting: Public utilities should be directed in particular to develop and submit a program to target one specific population with a special weatherization message. The population is that population which has "become poor." The elderly, for example, may have become poor with age. There may be other "new poor," such as the unemployed, who have "become poor." These households frequently do not recognize their eligibility for weatherization programs. Moreover, the self-perception of these populations as not being the population to receive welfare benefits must be overcome.

APPENDIX A

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APPENDIX B

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