ORIGINAL

Exhibit - N-30

2006 P-886

**NOVA SCOTIA UTILITY AND REVIEW BOARD**

**IN THE MATTER OF THE PUBLIC UTILITIES ACT**

**- and -**

**IN THE MATTER OF AN APPLICATION BY NOVA SCOTIA POWER INCORPORATED AND A HEARING FOR APPROVAL OF CERTAIN REVISIONS TO ITS RATES, CHARGES AND REGULATIONS**

**RESPONSES TO INFORMATION REQUESTS**

RECEIVED
JAN 12 2007
Nova Scotia
Utility and Review Board

To: The Attorney General of Nova Scotia representing Her Majesty the Queen in right of the Province of Nova Scotia

From: Nancy Brockway on behalf of the Consumer Advocate

**IR-1. Please specifically itemize Ms. Brockway's experience in the field of utility regulation since 1983 in (a) Canada; and (b) Nova Scotia.**

**RESPONSE:** Please refer to my resume and list of testimonies, attached as Exhibit NB-1 to my testimony. In addition, in the past, I have discussed utility issues informally (without remuneration) with Centre Helios and the Public Interest Advocacy Centre. As a member of the New Hampshire Public Utilities Commission, and as a staff member for the Maine and Massachusetts public utility commissions, I had experience with US/Canadian cross-border electricity issues, such as market design, interconnections, and the like.

**IR-2. Please specifically itemize Ms. Brockway's experience in the area of affordability of utility services in (a) Canada; and (b) Nova Scotia.**

**RESPONSE:** See the answer to IR 1, above.

**IR-3. Please confirm that, aside from four appearances before the Nova Scotia Utility and Review Board, Ms. Brockway has not provided testimony in any other proceeding in Canada. If Ms. Brockway has provided testimony in other proceedings in Canada, please provide full particulars of the proceeding(s) and a detailed description of the issues and topics addressed in her testimony, and any conclusions or recommendations that she made in her testimony.**

**RESPONSE:** I confirm the statement.

**IR-4. Please confirm that Ms. Brockway's past publications include at least one collaboration with the Roger D. Colton referenced in her direct testimony.**

**RESPONSE:** I confirm the statement.

**IR-5. Please confirm that Ms. Brockway's characterization of Mr. Colton as a "leading expert" is her own opinion, and is not based on any published ranking of experts in the area.**

**RESPONSE:** Yes. There are no published rankings of low-income utility experts of which I am aware. As a nationally-recognized expert in low-income utility issues in the United States from 1991 through 1998, when I became a Commissioner of Public Utilities in New Hampshire, and having followed the issues closely since that time, representing at least one client specializing in low-income energy issues, and as the author of numerous papers on the topic, I am familiar with the field of experts in the area of low-income utility issues. I can confirm that Mr. Colton is one of a handful of such experts, and is widely recognized as a leading consultant in the field.

**IR-6. Please advise whether Ms. Brockway expects Mr. Colton to provide evidence in this proceeding.**

**RESPONSE:** I do not know.

**IR-7. Why was Mr. Colton asked by the Low Income Energy Network in Ontario to prepare his Ratepayer-Funded Home Energy Affordability Program for Low Income Households? Was it intended to be used in a regulatory proceeding, for lobbying, or for some other purpose, and was the report ever actually used for such a purpose?**

**RESPONSE:** I do not know.

**IR-8. Was Ms. Brockway involved in the preparation of Mr. Colton's Ratepayer-Funded Home Energy Affordability Program for Low Income Households, prepared for the Low Income Energy Network in Ontario.**

**RESPONSE:** No.

**IR-9. How did Ms. Brockway obtain a copy of Mr. Colton's Ratepayer-Funded Home Energy Affordability Program for Low Income Households, prepared for the Low Income Energy Network in Ontario.**

**RESPONSE:** It was provided to me either by Mr. Merrick or by Ms. McNeil of Dalhousie Legal Services.

**IR-10. Please provide the relevant statistical information for Nova Scotia that was relied upon by Ms. Brockway when she indicated on page 27 of her direct evidence that she concurred "with Mr. Colton that no more than 10% of income would be tolerable burden for a household using electricity for space heat, with a corresponding limit of up to half that figure for a household not using space heat." Please also confirm that what Colton said was that the percentage of income burden that appeared to trigger significant payment troubles (e.g., service disconnections) was in the range of 10% to 12% of annual income.**

**RESPONSE:** In concurring with Mr. Colton that 10% of income is a tolerable burden for a household using electricity for space heat, and a corresponding cut-off of half that amount for households not using space heat, I was agreeing with Mr. Colton's analysis that the maximum affordable percentage of household income devoted to shelter costs (30%) multiplied by the maximum affordable percentage of shelter costs devoted to home utility bills (20%) produces a maximum affordable percentage of income for utility bills of 6%. I concur in Mr. Colton's impression that burdens in the range of 10% to 12% of annual income appear to trigger significant payment troubles, and also with his footnoted observation that affordability concerns are triggered at lower levels, such as bills at 6% to 8% of income. The 30% limit is a figure used by the United States Department of Housing and Urban Development to identify unaffordable housing burdens. The 20% figure is a rule of thumb in use among low-income utility experts in the United States. I relied on my memory of burdens I calculated to be at or below corresponding burdens on median income customers (as described in my testimony) from calculations I performed in proceedings in the United States, as well as my memory of percentages designated as maximum burdens for the purpose of setting burden-based credits. I used no additional statistical information in evaluating Mr. Colton's proposal.

**IR-11. Please provide copies of the American research studies identified by Ms. Brockway on page 28 of her direct evidence and advise whether Ms. Brockway is aware of any Nova Scotian or Canadian studies. If so, please provide copies of those as well.**

**RESPONSE:** I do not have copies of such studies, other than the evaluation of the Equitable Gas low-income affordability program prepared in 1996 by H. Gil Peach, Ph.D. A copy of that evaluation is attached.

**IR-12. Please confirm that the eligibility requirements for the program described in Mr. Colton's Ratepayer-Funded Home Energy Affordability Program for Low Income Households, prepared for the Low Income Energy Network in Ontario, does not distinguish in any way between households with children and those without children, nor does it distinguish between households of different sizes (i.e. a "household" could be one or more individuals).**

**RESPONSE:** I cannot confirm the statement in this information request as presented. It is true that on pages 8-10, in Mr. Colton's section titled "Calculation of the Tiered Discount," Mr. Colton does not distinguish between household sizes in its application of income tiers. However, Mr. Colton makes clear on page 3 that rate affordability credits "should be tied to the most recently available Low Income Cut Offs (LICO)." As he shows, LICOs are based not only on household income, but on household size. See also Mr. Colton's summary of recommendations on page 40, where he recommends that for the Rate Affordability program component "Eligibility is set at the Low Income Cut-Off (LICO)." Mr. Colton states on page 4 that in order to be eligible for the rate, a household must meet both the LICO cut-off and the percent-of-income threshold. If one wanted to tie credits to both income and household size, one could arrange tiers for application of credits that are tied to various percentages of LICOs.

**IR-13. On page 28 of her direct evidence, Ms. Brockway states that, "In the case of every utility where I have looked at the data, low-income households make up a disproportionate number of households receiving late notices and disconnection notices, and of the households actually disconnected." Please provide the relevant statistical information for NSPI and the other utilities that Ms. Brockway has looked at.**

**RESPONSE:** I sought information from NSPI on the proportion of late notices and disconnection notices, and actual disconnections, by the income of its customers. NSPI stated it does not have such data. I do not have source data for the statement with respect to other utilities, except in the case of Equitable Gas. A copy of the evaluation of its rate affordability program conducted by H. Gil Peach, Ph.D. in 1996, is attached. Mr. Colton references evaluations such as this done in Pennsylvania of burden-based programs there, and my memory of the study of those evaluations is consistent with the statement I make, and is the chief basis for the statement.

**IR-14. Please provide the statistical information for Nova Scotia relied upon by Ms. Brockway to support her comments on the connection between lack of electricity and (a) success in school, (b) health, (c) employment, and (d) "other aspects of normal household life" (please also explain what "other aspects" are being referenced).**

**RESPONSE:** This comment is based on my 20+ years of experience representing low-income electricity customers, analyzing their situation and the consequences of their poverty, and reviewing trade literature and scholarly articles on these topics. I made

no study of Nova Scotia circumstances, beyond satisfying myself that poverty in Nova Scotia is similar to poverty elsewhere, with reference to a differential access to goods and services, which in turn has adverse impacts such as those mentioned in the referenced statement.

**IR-15. On page 29 of her direct evidence, Ms. Brockway advises that "women, single mothers with children, visible minorities, people with disabilities, people in receipt of social assistance, seniors etc." have disproportionately less ability to pay electric bills.**

**RESPONSE:** The groups noted are disproportionately likely to have incomes below a reasonable definition of poverty. This in turn by definition means that their incomes are not sufficient to ensure the ability to pay for all necessary costs of living. In Canada, in the absence of an agreed-upon definition of poverty, analysts use the Low Income Measures, or the Low Income Cut Off estimated by Statistics Canada. The Low Income Measures (LIM) is a fixed percentage (50%) of median adjusted family income. Nova Scotia Statistical Review 2005, p. 82. The Low Income Cut Off (LICO) is an income threshold below which a family is likely to spend significantly more of its income on food, shelter and clothing than the average family. The relationship between income and the necessities of food, shelter and clothing is at the heart of the LICOs. *Id.* at 83. The LICO is based on the Survey of Household Spending (SHS). Electricity is included in the bundle of costs labeled "shelter." See, e.g., http://www.statcan.ca/Daily/English/061212/d061212b.htm, the results of the SHS for 2005. Further information breaking down Canadian households by LICO and other and by additional demographic variables can be found on the web at:
http://www12.statcan.ca/english/census01/products/standard/themes/RetrieveProductTable.cfm?Temporal=2001&PID=60978&GID=355313&METH=1&APATH=3&PTYPE=55496&THEME=54&AID=0&FREE=0&FOCUS=0&VID=0&GC=0&GK=0&SC=1&SR=1&RL=0&CPP=99&RPP=9999&d1=0, and associated pages.

**a. Please provide the statistical information for Nova Scotia relied upon by Ms. Brockway to support her statement that women are less able to pay electric bills.**

**RESPONSE:** Women are disproportionately more likely to have incomes in the poverty range than men. See the attached report "Income Distribution in Canada," prepared by Genuine Progress Index for Atlantic Canada, July 2001, at p. 40.

**b. Please provide the statistical information for Nova Scotia relied upon by Ms. Brockway to support her statement that single mothers are less able to pay electric bills.**

**RESPONSE:** Single mothers are disproportionately more likely to have incomes in the poverty range than two-parent households. See "Income Distribution in Canada," at pp. 40-41.

**c. Please provide the statistical information for Nova Scotia relied upon by Ms. Brockway to support her statement that visible minorities are less able to pay electric bills.**

**RESPONSE;** According to Statistics Canada, using data taken from the above web page on demographic characteristics of Canadian low-income and non-low-income households, private households headed by a visible minority are more than twice as likely to be low income than all households regardless of minority status of head of household. There is no reason to expect that this relative disproportion does not hold true in Nova Scotia.

**i. For purposes of this statement, what is a "visible minority"?**

**RESPONSE:** A visible minority is a person who is of a minority group and whose minority status is visible by virtue of skin color or other visually identifiable characteristics. The Nova Scotia Statistical Review defines visible minorities to include Chinese, South Asian, Black and Filipino individuals.

**d. Please provide the statistical information for Nova Scotia relied upon by Ms. Brockway to support her statement that people with disabilities are less able to pay electric bills.**

**RESPONSE:** According to the summary of results of the 2001 Participation and Activity Limitation Survey (PALS), during the working-age years 15-64, persons with disabilities are almost twice as likely to experience low income as others (26.6% versus 13.9%). See this summary at: http://www.hrsdc.gc.ca/asp/gateway.asp?hr=/en/hip/odi/documents/PALS/PALS001.shtml&hs=pyp

**i. For purposes of this statement, what is a "disability"?**

**RESPONSE:** A disability as used in this statement is "an activity limitation or a participation restriction associated with a physical or mental condition or a health problem." This is the definition used by the Government of Canada in its PALS.

**e. Please provide the statistical information for Nova Scotia relied upon by Ms. Brockway to support her statement that people in receipt of social assistance are less able to pay electric bills.**

**RESPONSE:** Social assistance levels run well below the Low Income Cut Offs in Nova Scotia. According to the discussion of the Adequacy of Benefits in the report Welfare Incomes 2004 by the National Council of Welfare, social assistance ranges from 36% of LICO for a single employable person to 65% for a couple with two children. This data is available at http://www.ncwcnbes.net/htmdocument/reportWelfareIncomes2004/WI2004EngREVISED.pdf.

**f. Please provide the statistical information for Nova Scotia relied upon by Ms. Brockway to support her statement that seniors are less able to pay electric bills.**

**RESPONSE:** The statement in my testimony should have referenced unattached individual seniors. Seniors without further qualification are less likely than the total population of individuals to have incomes below LICO. Unattached seniors are more likely than the total population to have incomes below LICO. This information is available in the Nova Scotia Statistical Review, page 82, "Persons in Low Income After Tax...Nova Scotia, 1999 to 2003."

**i. For purposes of this statement, who is a senior?**

**RESPONSE:** Statistics Canada identifies seniors for the purposes of the referenced data as persons 65 years of age and older.

**g. Please specifically list all of the groups covered by the "etc" reference in the above-noted statement, and for each provide the relevant statistical information for Nova Scotia relied upon by Ms. Brockway to support her statement that these persons are less able to pay electrical bills.**

**RESPONSE:** The groups covered by the "etc." reference in the above-noted statement are groups of individuals whose incomes are chronically reduced below affordable levels as a result of circumstances beyond their control.

**IR-16. For each of the 26 low-income bill affordability programs referenced by Ms. Brockway on page 30 of her direct evidence, and shown on Exhibit NB-8:**

**RESPONSE:** Available information on the programs offered by utilities can be retrieved at links at http://liheap.ncat.org/profiles/energyhelp.htm. I do not have information on the statutory authority for all programs, other than the information provided at the cited link, and some information from memory.

**a. Please provide copies of the statutory authority for each utility provided rate assistance program identified.**

**RESPONSE:** See above. In addition, I can provide the following information from memory:

1. the reduced customer charge offered by Alabama and Mississippi affiliates of Southern Company to certain low-income customers is provided under general utility statutes requiring just and reasonable rates and prohibiting undue discrimination.

2. at least the following states have express statutory authority for affordability assistance, whether under a restructuring structure or otherwise: California,

Connecticut, Delaware, District of Columbia, Georgia, Illinois, Maine, Maryland, Massachusetts, Michigan, Minnesota, Nevada, New Hampshire, New Jersey, Ohio, Oregon, Pennsylvania, Rhode Island, Texas and Wisconsin.

3. at least the following states had low-income affordability programs authorized by regulators under general ratemaking authority before the introduction of express statutory authority: Maine, Massachusetts, Ohio, Pennsylvania.

**b. Please identify the type of utility identified for each state (i.e., electric, gas, etc).**

**RESPONSE:** See above.

**c. Please advise whether each utility provided rate assistance program is approved by a regulatory commission or authority, and if so, advise whether each such program was approved following an application by the utility for such a program or imposed upon the utility by the regulatory authority.**

**RESPONSE:** See above.

**d. Please describe the eligibility requirements for each utility provided rate assistance program identified.**

**RESPONSE:** See above. The range of income limits is usually stated as a percentage of the Federal Poverty Limit, a set of income limits that is set on a nationwide basis (with the exception of separate limits for Alaska and Hawaii), and varies based on household size.

**e. Please describe the method by which payment amounts are determined for each utility provided rate assistance program identified.**

**RESPONSE:** See above. From memory, at least New Hampshire, Ohio, and Pennsylvania have some form of explicitly burden-based utility rate assistance.

H. Gil Peach & Associates
Monograph 969-1

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# Impact Assessment of the Equitable Gas Company Energy Assistance Program

*An Independent Analysis of the Energy Assistance Program (EAP), an account management pilot designed to make energy affordable.*

RECEIVED
JAN 12 2007
Nova Scotia
Utility and Review Board

September 1996

Prepared for:
Equitable Gas Company
Sandra L. Gagorik, Manager
Assistance Services Division

Prepared by:
Scan America
H. Gil Peach, Ph.D.
Anne West, B.S.
Helen Perrine, M.Ed.
Howard Reichmuth, P.E.

**Suggested Citation:** Peach, H. Gil, Anne West, Helen Perrine & Howard Reichmuth, *Impact Assessment of the Equitable Gas Company Energy Assistance Program.* Beaverton, Oregon: H. Gil Peach & Associates, 1996, Monograph 969-1.

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# Quick Summary of Results of the Study

## I. Executive Summary

The Energy Assistance Program (EAP) Impact Evaluation Report provides answers to several practical questions regarding the program based on measurement and analysis. This Executive Summary provides the questions, the results, and recommendations which have been developed from the study.

### A. Results

(1) **Are customers enrolled in EAP willing and able to pay the offered EAP price?** Yes, a significant sector of low-income payment-troubled customers successfully meet the requested payments of the EAP offer. Of those who enter the pilot EAP, about 70% fully met the EAP requirements in the participation year. The success rate for two full years is 68%. EAP benefits the customer and Equitable by introducing a very strong reliability – that is, stable payment behavior among payment-troubled, low-income customers. (See Section IV, A: Will Participants pay the EAP Offered Price?)

(2) **Is the offered price sufficient to insure the customer pays the variable cost of gas plus a contribution to fixed price?** Yes, analysis demonstrates that those who are successful in EAP pay in full the variable cost of gas plus a contribution to fixed cost. (See Section IV, B: Will the Payment cover the Variable Cost of Gas?)

(3) **Does EAP restore the pattern of regular payment?** Yes, although the size of each payment is less than would have been asked (but only received on an erratic and unstable basis), EAP has been very successful in restoring to payment-troubled low-income customers the pattern of regular payment. (See Section IV, C: Does EAP help restore the Pattern of Regular Payment?)

(4) **Does EAP help participants bring in more grant funds?** Yes, EAP participants bring in more grant funds in the Participation Year than in the Baseline Year. For those who remain in the program for the full Participation Year, this difference is about $70 per customer which is contributed to the bottom line. (See Section V, Do EAP Participants bring in more Grant Funding?)

(5) **Is there any abuse of the program through significant increase in energy consumption?** No. Although it is always a good question to ask, analysis in this study demonstrates that there is no tendency on the part of EAP participants to abuse the program by increasing energy use. (See Section VI: Is there any Problem of Abuse of Energy Consumption)

(6) **Does EAP help customers contribute to a reduction in arrearage amounts?** Yes. Success in EAP through continued participation results in yearly reduction of arrearage, about on the same order as participation in traditional approaches to collection. The amount of yearly reduction is small (about $75.00) in both cases, but the direction is toward reduction. (See Section VIII: Arrearage)

(7) **Overall, is EAP a cost-effective business investment for Equitable?** Yes. The program is revenue positive. Although consumer advocates might view EAP as a program supportive of customer needs, it is also a cost-effective business investment. Before EAP was introduced Equitable had approximately 8,700 payment-troubled low-income customers who were paying on average 50% of the offered price. EAP has provided an alternative that works for most of these customers by providing a lower price that 70% of those who enter pay consistently for at least one year, and 68% for at least the two years measured in this Study. Although EAP asks less, it collects about 100% of what is asked.

EAP is a good business investment for all of the reasons given by the empirical findings above. It restores the pattern of consistent payment of approximately 100% of the amount billed for over two-thirds of those who enter the program, and it is net revenue positive. In addition, restoration of the habit of reliable payment is an investment in the future for both the customer and the utility.

## B. Recommendations

Since the program is almost perfectly fulfilling its design, and is revenue positive, there are only a few recommendations. Recommendations are listed in two groups, in order of suggested priority.

### 1. Four Major Recommendations

1. **Perform a study of those who fall out.** Equitable has taken an intelligent approach to the critical problem of affordability in the design of its program . Yet some customers do not meet the payment requirements of the Energy Assistance Program. We recommend a a multi-year process study be made of those who fail in EAP both to

document what becomes of them and to see if there is a practical way to either retain them in EAP or otherwise meet their needs. Additionally, the number of customers in this group should be tracked over time to determine changes. See page 23.

2. **Increase payment for the top two poverty groups.** Consider increasing the payment of the 51% - 150% poverty group from 8% to 10% by the introduction of a sliding scale approach. It appears that this group could support additional payment. See page 106.

3. **Study cost impact of addition of arrearage forgiveness.** Ask the Corporate Comptroller to study the financial cost or benefit to Equitable of a direct arrearage forgiveness component. It may be that there is no real cost, beyond that already incurred by Equitable in carrying arrearage amounts which cannot be repaid. For those customers who meet the strict terms of the Energy Assistance Program for one year, arrearage forgiveness might be a way for both Equitable and customers to deal with current economic realities. See page 98.

4. **Expand and focus usage reduction activity.** There are new developments in baseload usage reduction. A substantial focus on a limited number of Energy Assistance Program homes to test the limits of current practical technology would be of value in developing knowledge for future application. See pages 85-86.

### 2. Five Minor Recommendations

1. **Add to monthly report.** Add a year against year "% change" column to the monthly *EAP Statistics* report. See pages 84.

2. **Add comparison format**. Add to the format of the *EAP Statistics Report* to allow comparison of performance of half-year entry groupings of participants. See pages 84.

3. **Track potential eligibles.** Add to the format of the *EAP Statistics Report* a year against prior year comparison of normalized consumption for potentially eligible customers who are not in the program. See pages 84.

4. **Consider collection of housing type and housing size data.** This, of course, is a standard customer database recommendation that is difficult to implement due to the effort and cost of any changes to the central customer accounting system. Still, addition of this information would greatly help analysis of energy reduction, and is also of use in competitive marketing. See page 84-85.

5. **Track senior status.** Add classifications by senior status to *the EAP Statistics* report. See page 85.

Section
2

# IMPACT EVALUATION

Energy Assistance Program

## II. Introduction

This section defines the representative study groups analyzed, specifies baseline and participation periods, and details the kinds of variables built into the data set which was analyzed for the study. In addition, mention is made to the standard data cleaning task, a subject which is expanded in the Consumption Analysis of Section V. For the reader who may prefer to move immediately to the research questions investigated, these definitions are repeated and developed where relevant to other sections of this report.

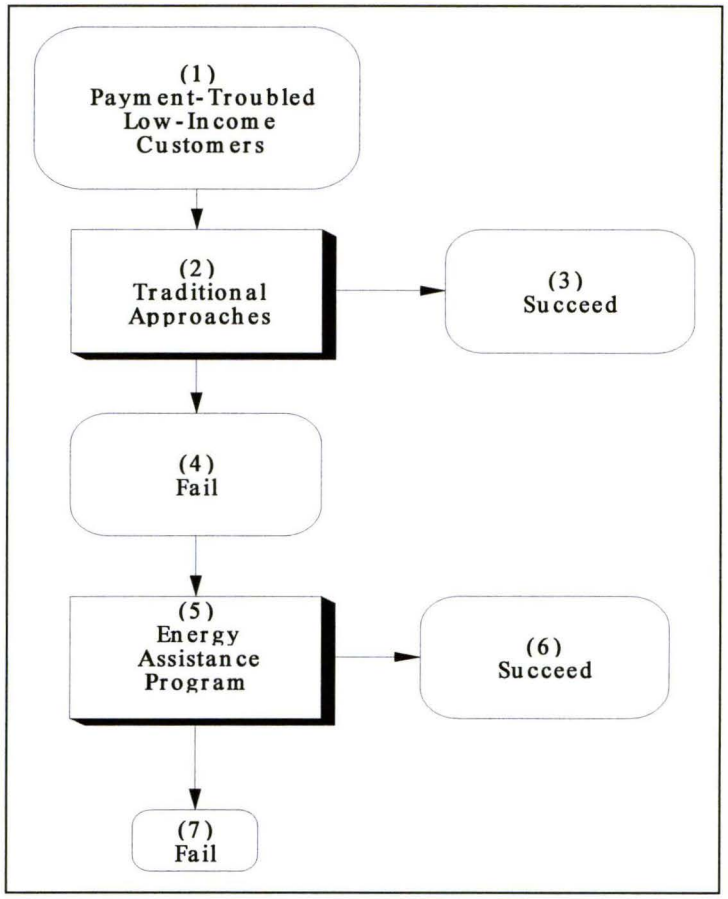
### A. The Energy Assistance Program (EAP)

The Energy Assistance Program (EAP) is an account management pilot program of the Equitable Gas Company. EAP is designed to permit low income customers to pay 8% of their annual household income for gas service.

EAP pre-dates and serves as one model for Customer Assistance Programs (CAPs) currently in place or under development at other

Pennsylvania utilities.[1] EAP also provides participants an alternative to the traditional collection methods.

**Figure II-1: The Energy Assistance Program**




[1] CAPs are designated as alternatives to traditional collection methods for low income, payment troubled customers. Customers participating in CAPs agree to make monthly payments based on household family size and gross income. These regular monthly payments, which may be for an amount that is less than the customer's current bill, are in exchange for continued utility service. Class A electric and natural gas utilities with gross intrastate annual operating revenues in excess of $40,000,000 should adopt the guidelines in §§ 69.263-69.265 (relating to CAP development; scope of pilot CAPs; and CAP design elements) implementing pilot residential CAPs. The provisions of this § 69.261, adopted July 24, 1992, effective July 25, 1992, 22 Pa. B. 3914. (172416) No. 218 Jan. 93.

As Figure II-1 illustrates, EAP is targeted primarily to customers who fail (box 4) in traditional approaches (box 2). That is, those who succeed in the traditional approaches to credit and collections for payment-troubled low-income customers (box 3) are not the objective of EAP. Thus, they might be expected to resemble EAP customers in energy consumption, but not in payment patterns.

For those for whom traditional collection procedures are effective, these may involve a series of collection letters, and one or more payment agreements resulting in restoration of a pattern of full payment for current service. For those for whom traditional collection procedures are not effective (box 4), the traditional approach involves a series of collection letters, a series of many payment agreements, and often multiple service terminations and reconnections, resulting in erratic payments which amount, on average, to about 50% of the yearly amount billed.

This study is primarily concerned with EAP (box 5), and especially with those who succeed in EAP (box 6). There also, of course, remain customers (box 7) for whom both traditional approaches and EAP are ineffective.

EAP was designed to provide a way for payment-troubled low-income customers to pay their bill, to motivate customers to conserve energy, encourage consistent bill payment behaviors, and increase participation in available assistance programs.

- To make 8% of annual household income cover necessary gas service, Equitable offers EAP credits to customers making regular payments. The credit makes up the difference between the customer's bill and the customer's 8% EAP payment plus energy assistance grants.

## B. Evaluation Objectives

The purpose of the EAP Impact Evaluation is to compute the benefits and costs of EAP, *considered as an alternative option, to run alongside traditional collection methods*, to service payment-troubled low-income customers who do not succeed in the traditional approaches . Thus, this EAP Impact Evaluation focuses on payments and costs of both account management methods. It also examines possible changes in energy consumption.

## C. Study Groups

Three groups are examined in this study. As shown in Table II-1, the three groups are referred to as "New EAP", "Non-Participants", and "Ongoing EAP". The New EAP group consists of customers who were

**Table II-1: Study Groups**

| SAMPLE SIZE OF EACH STUDY GROUP (Two Treatment Groups & One Comparison Group) | | | |
|---|---|---|---|
| Col. 1 | Col. 2 | Col. 3 | Col. 4 |
| Study Group | Population Size (N) | Planned Sample Size ($n_p$) | Final Sample Size (n) |
| (1) New EAP | 1531 | 250 | 221 |
| (2) Non-participants | 705 | 300 | 298 |
| (3) Ongoing EAP | 622 | 300 | 308 |

not in EAP during the pre-period (the 12 months prior to October 1, 1993), and entered during a six month window from October 1, 1993 through March 31, 1994. The Ongoing EAP group is drawn from customers active in EAP in October 1993, regardless of their enrollment date. Two types of non-participant groups were considered for the study, one based upon a

record of payment problems, and the other based on receipt of LIHEAP at some time in the past. Since the LIHEAP group was found to have different consumption than either of the participant groups, and since some customer information was not available for this group, it was not used in the analysis. Only the comparison group defined by payment problems is used.

### 1. Group 1: New EAP Participants

Group 1 consists of EAP participants who were enrolled in the six months between October 1, 1993 and March 31, 1994. The selection of Group 1 also ensured there was no EAP participation by group members in the pre period, with EAP participation in the post period.

### 2. Group 2: Non-participant Comparison Customers

Non-participants, each of whom has been identified as both payment troubled and income eligible for EAP make up Group 2. The income requirement, as for EAP, was set at or below 150% of the Federal poverty level. To determine this percentage, income and expense statements were provided verbally to Equitable by the customer between October 1, 1993 and March 31, 1994. These customers were payment-troubled, low-income (and specifically, income eligible for EAP) but chose not to participate.[2] These customers are necessarily a special group, highly *self-selected* for optimism about ability to return to full-payment status. Due to

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[2] In contacts with Equitable staff and contractors, customers are advised of traditional payment arrangements as well as of EAP, so that EAP is always presented in the context of the traditional alternatives. The intent is to allow customers to *self-select* into the traditional alternatives if they feel they can handle them. For customers who are only temporarily payment-troubled, for example, a budget plus plan can offer good advantage. EAP also has a higher "hassle factor" since it requires substantiation of income, while the traditional approaches do not. It appears that those who feel they can catch up their payments on a budget plus plan select from the traditional options.

self-selection, they are not a workable comparison group in the area of payment behavior (and are not used), although they can serve (and are used) as a comparison group in the area of energy consumption.

### 3. Group 3: On-going Participants in EAP

The source for this group is the full pool of EAP participants active in October 1993 regardless of their enrollment date. In this selection, there was EAP participation in both the pre and post periods. However, to insure continued comparability, a verified income/expense statement for income change or annual reevaluation was
required between October 1, 1993 and March 31, 1994.

### 4. Sample Selection

As is usual for practical studies of this type, in order to insure representative results, systematic random samples were drawn. Each sample consists of every "$n^{th}$" case in its respective population. The groups include two 'treatment' groups of EAP participants, and one 'comparison' group of non-participants. The samples were selected as follows.

New EAP: There were 1,531 eligible accounts in this group and every sixth account was selected. The resulting sample size is two hundred and fifty.

Non-participants: There were 705 eligible accounts in this group and every second account was selected for the sample. The resulting sample size is three hundred.

Ongoing EAP: There were 622 eligible accounts in this group and every other account was selected. The resultant sample size used in the study is three hundred.

### 5. Data Cleaning[3]

As always occurs once the planned samples are generated, a closer look at the data required some reassignment of accounts between groups to ensure that each case met the correct definition for its group. This included moving Group 1 accounts with EAP in the pre period to Group 3. Duplicate accounts were removed from the improper group and kept in the proper group. New EAP (Group 1) accounts with no EAP in either the pre or post periods were checked and kept in Group 1. These were enrollees who entered and left EAP during the six-month enrollment window for the New EAP group (Group 1). Two Group 2 accounts were missing pre period data and were dropped. The final numbers in each group are reported in Table II-1, column 4.

## D. Baseline and Participation Periods

The baseline ("pre") and participation ("post") periods were selected to take advantage of the data available within Equitable's system, minimizing the use of archival tape libraries. The *baseline year* was defined as October 1, 1992 through September 30, 1993. The *participation year* was defined as April 1, 1994 through March 31, 1995.

Both the baseline and participation periods capture a full heating season, and are a full year in duration. Because billing cycles vary, the twelve pre and post periods were not the same calendar months for all accounts analyzed. The periods could vary by one month from one account to the

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[3] The energy consumption analysis in Section VI was performed on a subset.

next. The periods can be roughly equated to months however, and seasonal variability is evident in the data.

## E. Data

Equitable conducted the random selection, and provided data for all accounts. Data was provided for 12 baseline months and 12 participation period months. Data included the account number, income information, poverty level data, consumption, type of meter read, bill date, special agreement codes, billing data, bill adjustments by amount and type, end balances, budget month code, bill message codes, credit action codes, transfer amounts, weatherization code and year. Energy assistance grant data was provided, as well as EAP credits, and the beginning accounts receivable at the onset of the pre and post periods. Also, summary data was provided for each account. This listed the number of service transactions, including various termination and disconnect letters, 'no meter read' letters, personal contacts, termination and reconnection, and payment extension, negotiations, and changes. High bill complaints, informal and formal mediations were also included. Costs were provided for each type of transaction for the pre and post periods. Additional data was provided which aged the arrearage for the beginning account balance at the onset of the pre and post periods.

## F. Traditional Payment Plans

EAP is designed to assist payment-troubled low-income customers with bill payment, specifically designed to assist customers for whom traditional credit and collection response are ineffective. And, as noted above, it was designed to offer an alternative to various 'traditional' payment plan options available to customers.

When the 'traditional approach' is referred to in this study, it designates the following set of four basic options. One option is the Budget Plus Plan, which has three avenues for service delivery. The other three options each have a single avenue for service. In the end each option within the traditional approach tends to return the customer to an equal monthly payment format, or a payment plan under standard residential pricing.

### 1. Budget Plus Plan

- *Company Negotiated Payment Plan* Budget Plus plan negotiated with the customer by an Equitable representative over the phone, or in person. This is an average monthly bill based on the past annual consumption, plus an additional amount toward the arrearage. The additional amount is based on income/expense information supplied by the customer.
- *Company Overflow to Payco* Same as Company Negotiated Payment Plan; however, completed by a contractor, Payco American Corporation (Payco), an accounts receivable management company.
- *Budget Plus Option, mail in acceptance* The Budget Plus Option offered to customers on their bill. The Budget Plus Option is the average monthly bill plus 1/12 of the arrearage. Customers accept the plan by making the average payment offered.

### 2. Bureau of Consumer Services Informal Mediation Decision

A customer having payment problems may also appeal to the Bureau of Consumer Services for informal mediation. A payment agreement resulting from an informal mediation decision may be issued by the Bureau of Consumer Services, Pennsylvania Public Utility Commission (BCS).

### 3. Account Monitoring

Plans negotiated with delinquent customer accounts transferred to Payco or Credit Bureau Corporation (CBC) for monitoring and collection.

### 4. CCCS

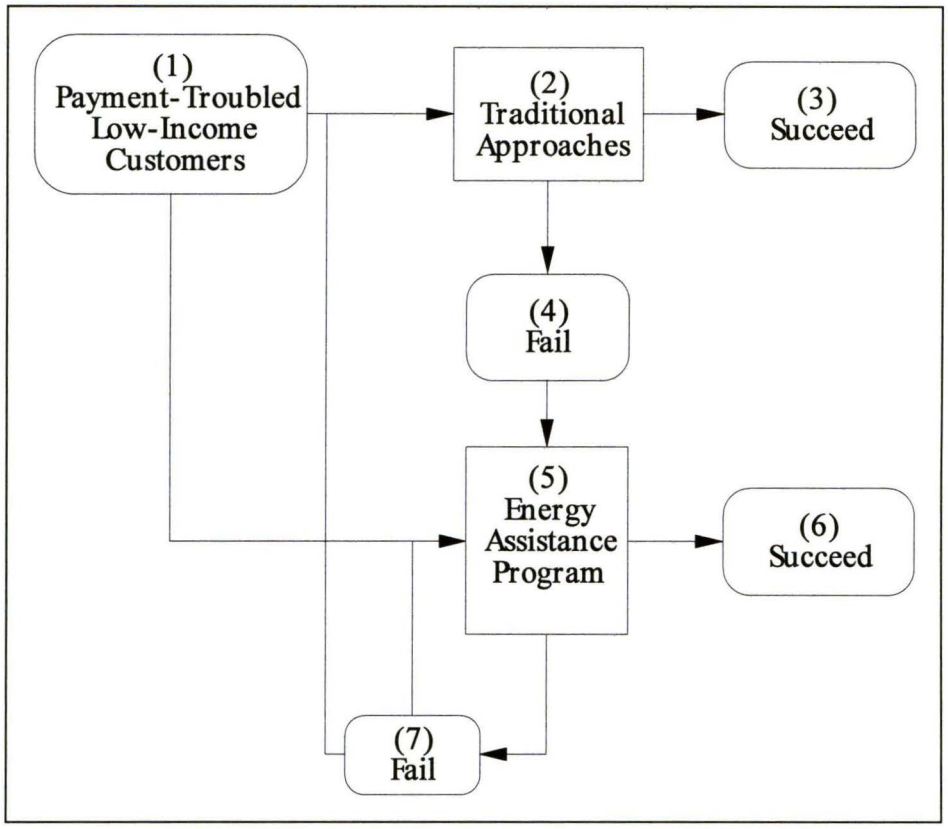
An agreement negotiated through budget counseling conducted by Consumer Credit Counseling Service of Southwestern Pennsylvania.

## G. Movement Among Options

As shown in Figure II-2, customers may succeed in restoring full payments through either the traditional approaches (discussed above), or through EAP (which offers a lower price – based on a percentage of income, but requires consistent payment). EAP was designed for customers for whom the traditional approaches are ineffective (box 4), so its recruitment is primarily from those who try traditional approaches and fail (box 4) and those who anticipate failure in traditional approaches and move directly to EAP (box1 to box 5).

Those who fail in the traditional approaches (box 4) may find EAP to be a workable alternative. Those who fail in EAP (box 7) are returned to the traditional approaches (box 2) and may also reapply for EAP under certain conditions. Previous to EAP, customers who were unable to stabilize payment behavior with traditional approaches, would "churn" through the various traditional options, and, on average, pay about 50%

**Figure II-2: Movement Among Options**




of the billed amount for a year. The theory is that EAP would stabilize a sizable group of these customers, restoring the habit of consistent payment. Those who fall though both traditional approaches and EAP would be in a group (box 7) which would continue to "churn" among the various options. As before, those who fall through will pay, on average, about 50% of the billed amount, while creating costs to Equitable. But with EAP the number of customers caught in this situation should be much less.

Section
3

# Theory of the Program

## III. The Theory of the Energy Assistance Program

This section of the report details the economic motivation for the Energy Assistance Program (EAP) and shows how it has been structured to yield a balance of benefit to participants, non-participant customers, and to Equitable. The rationale of the program is explained, and the effect on payment-troubled low-income customers is described.

### A. The Economic Background of EAP

EAP has been carefully structured as a balanced program to provide economic benefit to Equitable, to all customers not in the EAP program, and to EAP participants. In an economic sense, it is a mature and well thought through institutional response to the economic stresses which have effectively restructured the American economy over the last twenty-five years. It is this kind of institutional response from the utility and state regulatory authorities that should help all parties through continuing economic adjustment. Recent economic changes have been dramatic, and although what can be done to diversify and re-invigorate the economy is being done, there are likely to be long-term problems for large numbers of individuals and families.

Both Pittsburgh and the State of Pennsylvania have relatively healthy and diversified economies today as the 20$^{th}$ century draws to a close. After severe shock, both the city and the state have in the main successfully recovered their long-term historical pattern of underlying economic

strength. But economic strength today and for the future does not mean the vigor characteristic of the exceptional period which began at the end of World War II and ended in the early 1970's. With continued corporate downsizing "good jobs" will continue to be replaced by "marginal jobs". Coupled with a continued weakening of the public welfare system, the economic insecurity long thought to have been relegated to past eras has returned as a fact of life for individuals and families. Thus, the watchword for any program which attempts to deal with economic problems is 'sustainability'. Intelligent program structuring for the future requires careful balance of interests to insure sustainability.

### 1. Underlying Long-Term Economic Strengths

Pittsburgh remains a key transportation and business center. Today, it is the largest inland river port city in the US, with an economy that has largely adjusted. While the economy seems poised for economic betterment over the long term, structural changes have left lasting negative effects on large numbers of individuals and families. These severe structural changes occurred with the general decline of manufacturing in the United States, and particularly with the decline of the steel industry. Pittsburgh's per capita personal income was an unspectacular, but still sturdy 105.3% of the national average in 1992. Pennsylvania itself has always been known as one of the wealthier states, in the 18th and 19th centuries it ranked second only to New York.[4] In 1993 Pennsylvania was 16th in rank among the fifty states in personal income per capita, up from a rank of 17th in 1980.[5] Thus both the city and

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[4] "The United States of America", *The New Encyclopædia Brittannica*, Vol. 29, 1988, 309.

[5] Source: Table No. 699, Personal Income Per Capita, by State: 1980-1993. US Bureau of the Census, *Statistical Abstract of the United States: 1994* (114th edition)
*(footnote continued)*

state economies have improved and will likely be relatively strong within the American context. But "relatively strong" no longer means either enough "regular jobs" or basic economic security for families. Part of the problem is that those at the higher income levels continue to earn more, raising the state's personal income per capita. But people at the lower end of the economic scale are finding it increasingly difficult to make ends meet.

### 2. Recent Structural Economic Weaknesses

The percentage of persons below poverty level in Pennsylvania rose between 1980 and 1992, from 9.8% to 11.7%.[6] In the City of Pittsburgh, 16.6% of families lived in households with income below poverty level in 1989, but 32.2% of Pittsburgh's children under 16 years of age and 14.4% of adults aged 65 and over were living in households with income below poverty level in 1989.[7] A total of 34.5% of Pittsburgh households received Social Security in 1989, and 13.7% received some form of public assistance.[8] There was a net shrinkage in manufacturing establishments of 64 from 1982 through 1987, and a dramatic loss of 41.1% of jobs in manufacturing employment in the same time period.[9] As a consequence

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[6] This compares with a rise from 13.0% to 14.5% for the US as a whole. Source: Table No. 732, Persons Below Poverty Level, by State: 1980 to 1992. US Bureau of the Census, *Statistical Abstract of the United States: 1994* (114th edition)

[7] Source: Table C. Cities – Poverty and Housing, Items 85, 89 & 90, P. 811. US Bureau of the Census, *County and City Data Book: 1994*. Washington, DC: US Government Printing Office, 1994.

[8] Source: Table C. Cities – Education and Money Income, Items 79 & 80, P. 810. US Bureau of the Census, *County and City Data Book: 1994*. Washington, DC: US Government Printing Office, 1994.

[9] Source: Table C. Cities – Labor Force and Manufactures, Items 143 & 145, P. 814. US Bureau of the Census, *County and City Data Book: 1994*. Washington, DC: US Government Printing Office, 1994.

*(footnote continued)*

of these changes, the city's population declined from 423,959 in 1980 to 366,852 in 1992, a decrease of 13.5%.[10]

### 3. The Need for EAP, or Something Like It

For both customers and the utilities which serve them, the structural sources of this problem are largely outside the control of those affected and concerned.[11]

#### a) Major Shift in the Job Structure Necessitates EAP

As suggested by the economic statistics cited above, the sources of Pittsburgh's problems are rooted in the American national economy rather than originating in local conditions. Long-term changes in America's urban job structure, in particular the decline of high-paying full-benefit jobs in basic industry, as well as in changes in the age distribution of the urban population are factors largely beyond the control of any city or state. The closing of area steel mills greatly increased unemployment. Many displaced steel workers and workers in associated industries were forced to either leave the area or take jobs at less than half their previous steel-making wages. This kind of pressure on the job structure of an urban region, in turn pressed out of regular employment large numbers of other

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[10] Source: Cites With 200,000 or More Population Ranked by Selected Subject, P. xxvii. US Bureau of the Census, *County and City Data Book: 1994*. Washington, DC: US Government Printing Office, 1994.

[11] As suggested in the set of family case studies included in the Process Evaluation, for nearly everyone inability to pay occurs as something that happens to the individual or family as an outcome of contingencies or life events. EAP participants are drawn from all social groups and all walks of life, to whom – simply put -- something economically damaging and beyond the sphere of personal control has happened. Peach, H. Gil, Helen E. Perrine & Anne V. Patton, *EAP Process Evaluation*, July 1994, Part IV, Case Study Profiles, Pp. 61-76.

people who would have otherwise accepted employment in low-wage, no benefit jobs in a full-employment economy.

At the same time, currently US many young college graduates cannot look forward to careers in the fields for which they have been trained, there are few scientific and technical jobs in relation to senior level applicants, and middle and upper level business managers live with the insecurity of continued waves of re-engineering and downsizing. Although the economy is doing well according to the standard economic indicators, there have been strong qualitative changes which tend to disconnect the indicators from the everyday human concerns of "good jobs", family health and well-being, and economic security. Currently, there is no indication that these trends are likely to turn about.

b) Major Shift in the Age Structure Necessitates EAP

Another critical factor which makes a program such as EAP necessary is the unusual age structure both in Pittsburgh and in Pennsylvania. The age structures of Pittsburgh, and of Pennsylvania as a whole are particularly striking. Slightly over 17% of persons living in the Pittsburgh Metropolitan Statistical Area (MSA) were aged 65 or older in 1990. This means that the Pittsburgh MSA is eleventh out of the 192 MSA's as defined by the US Office of Management and Budget. But this ranking must be further qualified, since eight of the ten MSA's with a higher

proportion than Pittsburgh of adults aged 65 or over are in Florida.[12] These communities are retirement destinations that attract the financially well-off older Americans, who can generally bring a substantial retirement income to Florida. In contrast, many elderly citizens in Pittsburgh may not have access to much beyond Social Security income.

Among cities with 200,000 or more population, Pittsburgh's percentage of persons 65 years and over in 1990 was 17.9%, placing second only to St. Petersburg, Florida for which the percentage was 22.2%.[13] For the state as a whole, percentage of persons aged 65 or older in 1993 was highest in Florida (18.6%), but Pennsylvania (15.8%) was second among the fifty states.[14]

## B. EAP as a Business Product

Equitable's Energy Assistance Program (EAP) is probably best viewed as a business product. While it is true that EAP offers significant benefits to customers who meet its conditions, it is not a benefit program. Similarly, while EAP attempts to encourage careful energy use, it is not primarily a

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[12] Also, nearly all the MSA's with higher percentages of persons aged 65 or older are noted retirement destinations: Sarasota-Bradenton, Florida (30.4%); Fort Myers-Cape Coral, Florida 24.8%); Fort Pierce-Port St. Lucia, Florida (23.6%); West Palm Beach-Boca Raton, Florida (24.3%); Daytona Beach, Florida (23%); Tampa-St. Petersburg-Clearwater, Florida (21.6%); Fort Lauderdale, Florida (20.8%); Scranton-Wilkes Barre-Hazelton, Pennsylvania (19%); Lakeland-Winterhaven, Florida (18.6%); Monmouth-Ocean, New Jersey (17.3%). Source: Table No. 42, Metropolitan Areas—Population: 1980 to 1992; US Bureau of the Census, *Statistical Abstract of the United States: 1994* (114th edition).

[13] Table 3, Cities With 200,000 or More Population Ranked by Selected Subject, P. xxvii. US Bureau of the Census, *County and City Data Book: 1994.* Washington, DC: US Government Printing Office, 1994.

[14] Table No. 33, Resident Population, by Age and State: 1993, US Bureau of the Census, *Statistical Abstract of the United States: 1994* (114th edition) Washington, DC, 1994.

Demand-Side Management program. Overall, EAP is a practical arrangement designed to be mutually beneficial to the participant, to Equitable, and to other customers. It is offered only to payment-troubled low-income customers, and remaining in EAP means meeting fairly strict conditions.

The pricing model which underlies EAP is a variant of the kind of negotiated rate which many utilities set for a large industrial customer which might leave the system. This is, in fact, the precedent for pricing which does not fully cover cost, but yet is in the interest of the utility, the customer on the special rate, and all other customers.[15]

### 1. EAP as a Price Offer

Different customer classes have always paid different prices for the same amounts of energy. Historically, utilities and regulatory authorities, while guided by the fundamental principle of equity in pricing, have adjusted for practical differences in cost of service, and for special conditions, such as economic development and various promotions. Today, the expectation is that in the transition to a more competitive market, the traditional grounding of price offers will gradually give way to competitive market pricing, at least for the largest customers of electric and gas utilities. EAP can be envisioned as a similar kind of brokered pricing for the most vulnerable residential customer segment.

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[15] It may be useful to think of EAP as similar to a negotiated rate, with attached conditions, applicable only to certain customers. As a thought experiment, imagine the rate and associated requirements and conditions for EAP customers to have been the outcome of negotiation with a broker which had assembled all payment-troubled low-income customers into a single large block. Of course, there is no broker, as such. But, as the industry shifts into more competitive arrangements, it may be useful to imagine the actions of the Commission, the Bureau of Consumer Services, and the Office of Consumer Advocate as if they were together a kind of broker, negotiating a mutually beneficial pricing arrangement for a vulnerable customer block.

### 2. How EAP Works: Benefits to Non-Participant Customers

In the standard price offer, and under traditional utility regulation, pricing is set so as to cover the variable cost of gas, the fixed cost, and a return on investment. In the EAP special offer, pricing is set so as to cover the variable cost of gas consumed by the customer, plus a contribution to fixed cost of service. EAP makes up the difference between a set percentage of income, which (with the addition of certain bundled restrictions and requirements) is the cost to the customer for EAP service, and the total cost to Equitable.[16]

### 3. How EAP Works: Benefits to the Participant

The participant currently pays eight percent (8%) of annual income, but must meet certain conditions, and make regular payments. Some participants will not be able to do this, and will fall through EAP just as they fell through the traditional payment options. But, out of the pool of about 8,700 customers who would otherwise be paying about 50% of the amount billed under the standard residential price offer, many will be able to regain control of their financial situation with regard to their gas bill. Success at the discipline of regular payment for the asking price can be of help generally, both in moving in a positive direction to deal with economic stress, and in a social and psychological sense. At the least, EAP can

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[16] Although related, the setting of the level of this price as a percentage of household income (or of different price levels when different percentages are offered for different percentages of poverty income), is a technical and policy question separate from the basic mechanism and concept of EAP. The setting of price is treated in a separate section of this report.

help many participating customers bring this segment of life under control.[17]

### 4. How EAP Works: Benefits to Company

Faced with increased collection costs and uncollectible balances as well as the possibility of having to shut off gas service to many low-income customers,

> Equitable recognized that a different approach was needed to:
>
> (1) Remove these customers from the discouraging, expensive and often ineffective collection cycle,
>
> (2) Help customers reduce consumption and conserve natural gas,
>
> (3) Increase their annual participation in other available assistance programs, and
>
> (4) Encourage consistent bill payment.[18]

Although each of these objectives clearly benefit the participating payment-troubled, low-income customer, they also benefit Equitable.

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[17] As a side note, EAP and its younger sibling programs at other utilities are in line with 'traditional' values. EAP is not a benefit program, or an entitlement, but a mutually beneficial business arrangement. It offers alternative pricing, but only so long as the customer is consistent in making payments, and pays the agreed amount which is calculated based on standard criteria to benefit all customers, including those on the standard tariffs. It thus lines up with such traditional American values as inclusion, equity, and making a better life possible for everyone; but also with the value put upon 'work'. It takes personal focus, diligence, and ongoing effort to meet the conditions of the offer.

[18] Excerpted from "III. CAP Policy Statement/EAP Design Comparison," P. 7 of *Response of Equitable Gas Company to Ordering Paragraph 11 and Motion of Chairman David W. Rolka as Contained in Order Entered in Docket No. R-912164 on July 16, 1992*, Before the Pennsylvania Public Utility Commission, September 14, 1992.

a) Improving the Bottom-Line

Prior to EAP, Equitable found 8,700 payment troubled low-income customers for whom the traditional credit and collection approaches were not working. Although they were placed on budget plus plans, on average they were paying only 50% of billed amounts.[19] The basic economic fact is that without EAP, Equitable loses about 50% of the billed amount for approximately 8,700 customers. Thus, if EAP can help these customers restore the habit of regular (although smaller) payments, it is possible to both help the customer to get into a better economic situation in which they are able to meet their obligations, and to collect a higher percentage of the amount that would have been billed under the traditional approaches.

b) Reducing Consumption

EAP attempts to encourage conservation and discourage waste of energy.

c) Increasing Participation in Assistance Programs

By increasing customer participation in external assistance programs, the customer and Equitable bring in financial resources. This provides dollars which are credited to the customer's account.

d) Encouraging Consistent Bill Payment

Restoring the habit of consistent bill payment (of a smaller, but regular amount) is a wise long term investment on the part of Equitable. If the

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[19] III. CAP Policy Statement/EAP Design Comparison," P. 7 of *Response of Equitable Gas Company to Ordering Paragraph 11 and Motion of Chairman David W. Rolka as Contained in Order Entered in Docket No. R-912164 on July 16, 1992*, Before the Pennsylvania Public Utility Commission, September 14, 1992.

economy gradually improves, these customers will experience an easier transition back to standard pricing, and that is an advantage not only to the customer but also to Equitable.

### 5. Price Effects in Customer Groups

Like many other gas and electric utilities throughout Pennsylvania, Equitable Gas has experienced ongoing difficulties with payment-troubled customers since the late 1970's:

> Notwithstanding the payment plans developed and benefits offered under various programs, including Federal grant assistance, budget counseling and other funding efforts, these customers continue to fall behind in amounts owed for their natural gas service. During 1989, the Company analyzed the accounts of approximately 8,700 payment-troubled customers with household incomes at or below 150% of the Federal poverty guidelines. A comparison of the payment agreements negotiated with the Company (or directed by BCS) with the payments made, shows that these customers were paying, on average, approximately 50% of the monthly payment plan amounts.[20]

The group paying about 50% of billed amounts in 1989 is pictured in Figure III-1 (box 2). This group would, historically, have been quite small through the boom years of the 1950's and 1960's. By 1989, it was

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[20] Excerpted from "III. CAP Policy Statement/EAP Design Comparison," P. 7 of *Response of Equitable Gas Company to Ordering Paragraph 11 and Motion of Chairman David W. Rolka as Contained in Order Entered in Docket No. R-912164 on July 16, 1992*, Before the Pennsylvania Public Utility Commission, September 14, 1992.

**Figure III-1: Success & Failure Prior to EAP**

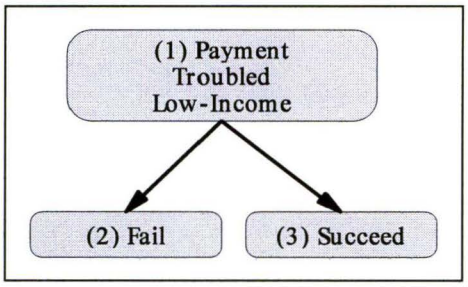
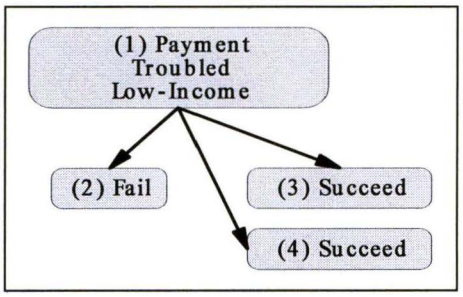



**Figure III-2: Success & Failure Following EAP**




becoming large, to the point at which an additional approach was judged by Equitable to be required. The addition of EAP is intended to maintain the success of traditional approaches for those customers for whom these approaches are effective (box 3), and to stabilize an additional group of customers who have shown that they can be effective in restoring the habit of consistent payment (although of a smaller amount per payment) in EAP (box 4, Figure III-2).

EAP has been carefully structured with respect to revenue concerns, so that although the price offer to customers in EAP is lower than the standard offer, the revenue effect will be positive if EAP customers make consistent payments. The basic theory of the program is thus to benefit all groups, including non-participants, Equitable, and participants. Beginning in Section 4, this theory is tested based on empirical program results.

Section
4

# Payment

## IV. Customer Payment Behavior

Payment is the key to whether a CAP-type program succeeds or fails, and this is true from all perspectives. The *utility* must be concerned with the bottom line of payment for service. Yet it is not a maximum payment today, but a workable payment and a stable relationship which is in the long-run interest of the utility.[21] Payment is important from societal, non-participant, and participant perspectives too. Generally, *society* expects people to pay for their consumption – if not the full cost, still some payment. From a societal perspective, it is not so much the amount of payment as the principle of payment in some amount which is important.

However, for the *non-participant* customer, there is a meaningful criterion as to the amount of payment by participants – if participants fully pay the variable (commodity) cost of energy plus at least some small contribution to fixed cost, the other customers will be better off. For the *participant*, it is important that the size of payment be small enough to be workable, but the participant is also benefited if the payment pattern is regular.[22]

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[21] As with any other rate, the payment amount is deemed fully adequate if it meets the offered price (set as a percentage of annual household income).

[22] The utility and society also benefit from restoration of the habit of monthly payment.

**Table IV-1: Succeeding in EAP (% who Stay 1 and 2 Years)**

EAP attempts to satisfy all of these needs and interests regarding pricing and payment. In this section of the study, analysis is oriented toward the utility perspective, but the other concerns are also present.

- The goals of the analysis of customer payment behavior in this section of the study are to determine:

  (a) Whether or not participant payment meets the offered price,

  (b) Whether this price covers the variable cost of gas plus a contribution to fixed price, and

  (c) If the pattern of payment is regular (reliable) for customers who remain in EAP.

As suggested by the questions in the box above, the customer payment goals of a CAP-type program have different dimensions that have to be looked at together before arriving at an overall assessment of how the program affects behavior.[23] *An affirmative answer to each of these questions will show that the program works as planned, in basic accordance with its design.*

## A. What Percentage of Participants will Pay the EAP Offered Price?

Paying at the price at which energy is offered under EAP has two aspects: retention of customers in EAP once they have begun the program, and percentage of the presented bill which is actually paid by participants. The specific indicators employed are percentage of customers entering EAP who remain in EAP for one year or two years;

[23] The utility, societal, non-participant, and participant interests have to be carefully balanced for a successful program. Note that this section of the study is limited to consideration of payment behavior. For cost/benefit, see Section IX.

| STAYING IN EAP | | | |
|---|---|---|---|
| Column 1 | Column 2 | Column 3 | Column 4 |
| Study Group | Year One | Year Two, if Year One | Year Two and Year One |
| (1) New EAP ($n_1$=221; $n_2$=114) | 70% ($n_1$=153; $n_2$=80) | Not applicable | Not applicable |
| (2) Ongoing EAP ($n_1$=142; $n_2$=120 | Not applicable | 97% ($n_1$=137; $n_2$=111) | Not applicable |
| (3) Combined | Not applicable | Not applicable | 68% p=(0.70*0.97) |
| (4) Adjusted for Re-Enrollment | 73.5% (70%+3.5%) | Not applicable | 71% p=(0.735*0.97) |
| Note: There are two pooled "New EAP" and two pooled "Ongoing EAP" groups analyzed. The larger in each set is the New EAP as employed throughout the report, the second is another New EAP with a different time-window, used as a check on stability of results. | | | |

**Figure IV-1: Direct Flow Chart of EAP Customer Retention**

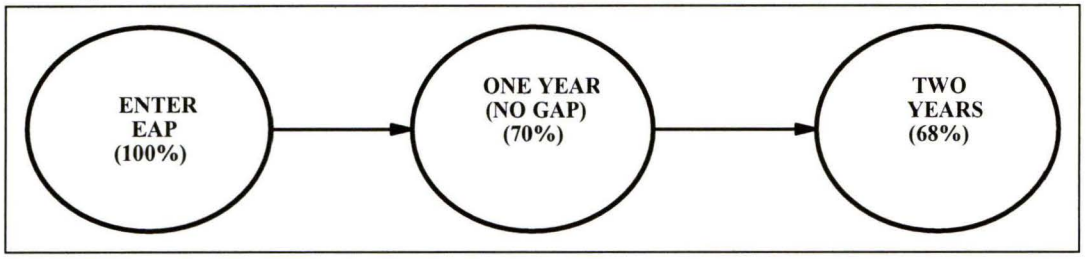
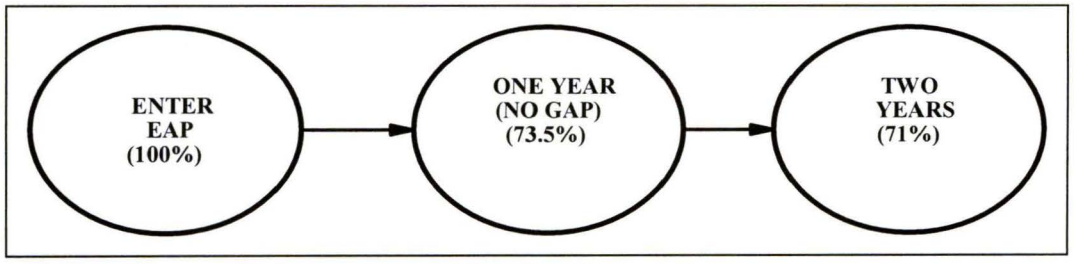



**Figure IV-2: EAP Retention adjusted for Re-Enrollments**




and the percentage of bill (under the EAP offered price) paid by these continuing participants.

### 1. Retention in EAP[24]

Retention is first discussed for all participants in New EAP and Ongoing EAP, and then examined by poverty level.

#### a) All Participants

As shown in Table IV-1 (row 1) and in Figure IV-1, of customers who enter EAP, at least 70% remain in EAP for at least one full year, not counting re-enrollments.[25] At the same time, 97% of customers who had met EAP requirements for one year, remained and met EAP requirements for a second full participation year (Table IV-1, row 2). Splicing these results together (70% from New EAP and 97% from Ongoing EAP) as if they referred to a single group gives a combined success rate of about 68% through two full years (Table IV-1, row 3), again not taking re-enrollments into account.[26].

The last row of Table IV-1 shows the result when re-enrollment is included. This result is also pictured in Figure IV-2, and detailed in the generalized flow diagram of Figure IV-3. In this figure, the first circle represents 100% of those who enter EAP. Subsequent circles show the future of this group as percentages of the initial entry group. As shown in

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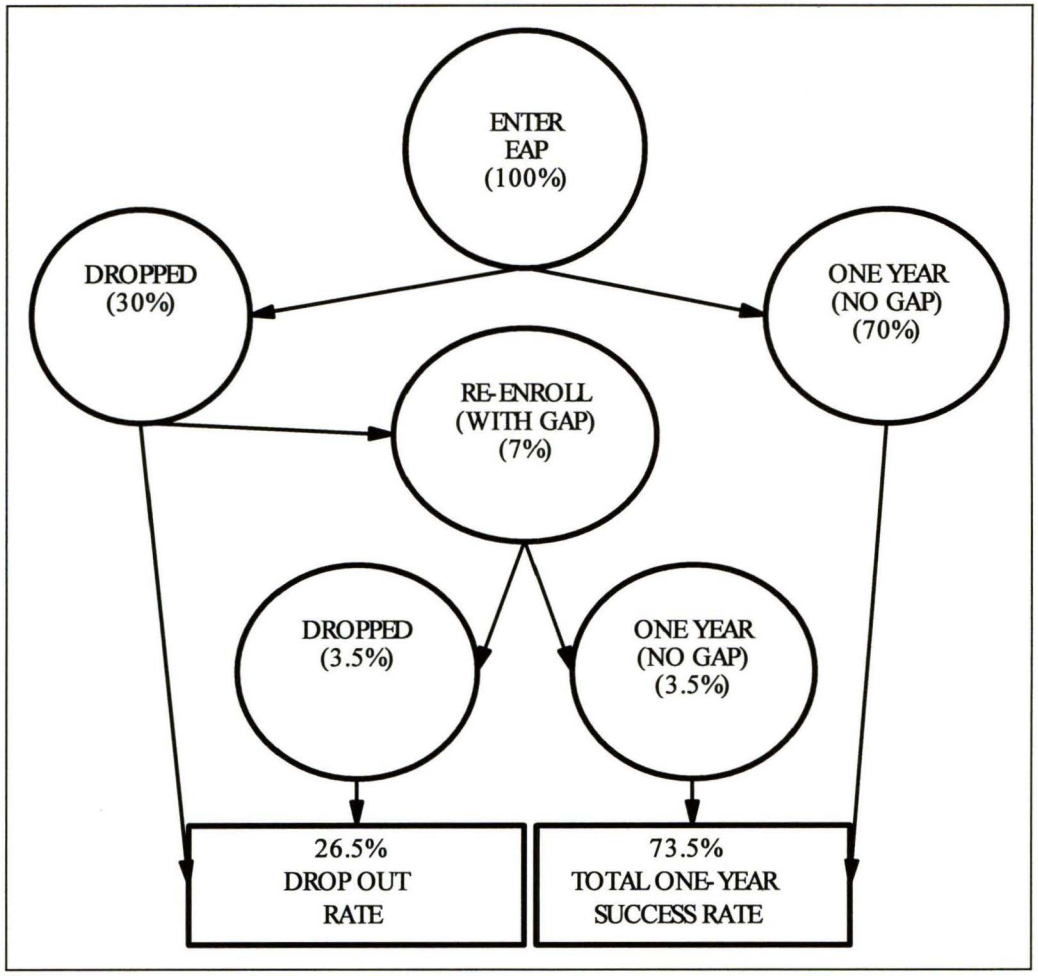
[24] Since the time horizon for this study was a two-year period, results are taken directly from the New EAP group, and from the Ongoing EAP group, and then spliced.

[25] Mortality and moving to a new address are not taken into account in Table IV-1 and Figures IV-1 through IV-3. Since these data were collected in order to support payment analysis, only participants who were at the same address for two years could be included.

[26] Splicing is performed by treating the data as a probability model. The probability of remaining one full year, once having entered EAP is 70% based on the percentages in the New EAP group data. The probability of remaining for a second full year, once having completed one full year is 97% based on the Ongoing EAP group data. The combined probability is the product, which with the decimals included rounds up to 68%.

the figure, about 7% of those initially dropped from the program subsequently re-enroll. One-half of those re-enrolling succeed in the

**Figure IV-3: Succeeding in EAP -- Final One-Year Results**




program, with at least one full year of participation in EAP after an initial gap. Within eighteen months of first entering EAP, better than 73% of participants experience at least one full year of continuous participation.

b) Retention by Poverty Level

The question of retention by poverty level brings the analysis of customer payment behavior to a more detailed level. At root, the concern in this sub-analysis is whether or not the program is functioning less well for

those at the lower poverty level. As in other parts of the study, the poverty levels are those used in the program: 0-50%, 51-100%, and 101-150% of federally defined poverty.

The comparison is made in Table IV-2 , which is a cross-tabulation of program retention by poverty level. A glance down column 3, the

**Table IV-2: Poverty**

| PROGRAM RETENTION AND POVERTY | | | |
|---|---|---|---|
| Column 1 | | Column 2 | Column 3 |
| Poverty Level | | Less than 12 Months in EAP | One Full Year |
| New EAP (n=335) | | | |
| 0-50 | n=73 | 36% | 64% |
| 51-100 | n=146 | 32% | 68% |
| 101-150 | n=116 | 25% | 75% |
| | | (n=102) | (n=233) |
| Ongoing EAP (n=428) | | | |
| 0-50 | n=85 | 11% | 89% |
| 51-100 | n=208 | 8% | 92% |
| 101-150 | n=135 | 8% | 92% |
| | | (n=34) | (n=394) |

percentage of each poverty group retained for one full year appears to show a weak tendency for retention in EAP to increase with level of resources. However, the tendency is very slight and the statistical significance test is unable to detect this size of relationship at a

meaningful level of statistical confidence.[27] A reasonable conclusion based on Table IV-2 is that there is a weak tendency for retention in EAP to increase with level of resources, although it cannot be confirmed to exist with a meaningful level of probability.

### 2. Percentage of Bill Paid

The second aspect of payment at the price at which energy is offered under EAP is the percentage of bill actually paid by participants. Since

**Table IV-3: Percentage of Year's Billed Amount Paid**

| PERCENTAGE OF TOTAL YEAR'S BILL PAID BY CUSTOMER | | | | | |
|---|---|---|---|---|---|
| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
| Paid by Customer | Year Prior to EAP (Group 1) | At least some First Year Participation in EAP (Group 1) | Stable First Full EAP Year (Group 1) | Stable: Two Full EAP Years (Group 3) | Qualified but never Entered (Group 2) |
| | No EAP pre-period | <12 Months post-period | 12 Mo. EAP post-period | 12 Mo. EAP post-period | No EAP pre or post |
| n | 221 | 68 | 153 | 137 | 258 |
| | | | | | |
| %Bill | 72% | 57% | 101% | 101% | 80% |

the program is designed to focus on keeping with the payment terms, those who do not pay are removed from the program. Essentially, each month or year of participation is participation at 100% payment. This is

[27] The value of Eta rounds to a correlation between poverty level and time which is generally considered less than "small". The Pearson Chi-Square test yields a two-tailed significance level is larger than 0.50, so according to the test the weak effect detected is likely to chance alone. At the same time the sample sizes in the table (335 and 428) are large enough to detect a small effect (Eta = w = 0.20) for a contingency table with two degrees of freedom (u=2) at a ninety-five percent level of statistical confidence with high power (90% and 95%, respectively). If an correlation of 0.20 or better were present in the data, it would almost certainly have been found.

shown in Table IV-3, where the 100% payment effect is demonstrated in the columns corresponding to stable participation for the first and second year (columns 4 & 5). Table IV-3 contrasts of "percentage of bill paid" for customers prior to entering EAP (column 2), with those who enter but subsequently drop out (column 3), and those who stay one or two full years (columns 4 & 5).[28] Also included is the payment percentage of persons who qualified for EAP, but did not enter the program (column 6).[29]

## B. Will the Payment Cover the Variable Cost of Gas?

As shown in Table IV-4, total customer payment is higher for customers outside EAP (columns 2 and 6) than for customers in EAP, which is a natural artifact of any program concept which provides an offered price lower than the standard price. But the important fact demonstrated in Table IV-4 is that each EAP participant group pays in full the variable cost of gas plus a contribution to fixed cost. This includes the group with partial participation in a given year (column 3), the group which succeeds in full participation for a year (column 4), and the group which succeeds in full participation for two years (column 5).

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[28] The other columns in Table IV-3 are included for reference, but comparison across is meaningful only in terms of percentage of billed amount. The rates in columns 2 & 6 are the standard residential rates, and column 3 melds months at different rates according to the individual customer.

[29] As discussed elsewhere in this report, those who technically qualify for EAP but do not enter form a self-selected group which opts for traditional (and less intrusive as to verification) approaches to credit and collections problems.

**Table IV-4: Covering the Variable Cost of Gas**

| CUSTOMER PAYMENT & THE VARIABLE COST OF GAS | | | | | |
|---|---|---|---|---|---|
| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
| Paid by Customer | Year Prior to EAP (Group 1) | At least some Participation in EAP (Group 1) | Stable: First Full EAP Year (Group 1) | Stable: Two Full EAP Years (Group 3) | Qualified but never Entered (Group 2) |
| | No EAP pre-period | <12 Months post-period | 12 Mo. EAP post-period | 12 Mo. EAP post-period | No EAP pre or post |
| n | 221 | 68 | 153 | 137 | 258 |
| Paid | 844.78 | 580.73 | 729.19 | 744.01 | 1262.18 |
| Variable Cost | 404.79 | 486.55 | 516.63 | 583.68 | 488.44 |
| % | 209% | 119% | 141% | 127% | 258% |

## C. Does EAP Help Restore the Pattern of Regular Payment?

Table IV-5 shows the effect of EAP participation on the regularity of payment. It is clear in looking across the columns of Table IV-5 that EAP is quite successful in restoring the pattern of regular payment. The two groups outside EAP, Group 1, in the baseline year before it enters EAP (column 2) and Group 2, in the second study year (the "participation" year), which continues to remain outside EAP although qualifying for EAP have payment profiles similar to each other. Those who begin EAP, but drop out in less than one year have the worst payment record (column 3), while stable EAP participants have the best record (columns 4 & 5). These two columns showing results of stable participation have quite similar profiles for frequency of payment.

**Table IV-5: Is Payment Frequency Reliable?**

| FREQUENCY OF PAYMENT (OUT OF 12 POSSIBLE) BY CUSTOMER | | | | | |
|---|---|---|---|---|---|
| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
| Paid by Customer | Baseline Not in EAP (Group 1) | At least some Participation in EAP (Group 1) | Stable: First Full EAP Year (Group 1) | Stable: 24 Months (Group 3) | Qualified but never Entered (Group 2) |
| | No EAP pre-period | <12 Months post-period | 12 Mo. EAP post-period | 12 Mo. EAP post-period | No EAP pre or post |
| n | 221 | 68 | 153 | 137 | 258 |
| Full Payments | 5.19 | 2.74 | 9.75 | 9.77 | 5.02 |
| Partial Payments | 3.15 | 3.18 | 1.19 | 1.22 | 3.73 |
| Missed Payments | 3.66 | 6.09 | 1.07 | 1.01 | 3.25 |
| Note: The cases in column 3 are stable second year cases. There may or may not be gaps in their prior year EAP participation. | | | | | |

## D. Discussion

This review of payment shows that EAP does work as designed: Most EAP customers are willing and able to pay the EAP price offered. Although there is attrition, the amount of stability demonstrated in this payment-troubled low-income sector is quite remarkable. EAP customers do pay the variable cost of gas, plus a contribution to fixed cost. And the program does result in restoration of a pattern of reliable customer payment.

Section

5

# Grants

## Energy Assistance Participation

### V. Do EAP Participants bring in more Grant Funding?

CAP-type programs can be developed, implemented, maintained and improved for many reasons. Some major utilities see these programs as sound business policies, both because they place the company on the "high road" of customer service, business ethics, and community concern and because they can be a part of positioning for the increasingly competitive future. The first of these reasons is ethical, and needs no further justification. The second stems from high level business strategy, and can be put forward as a policy with a long-run and strategic justification. But CAP-type programs are different from management initiatives such as exploring new products and services or studying the possibility of ventures in fields related in some way to the core business. They are like such initiatives because they are new ventures in defining price and product, but they can bring in income from three sources: (1) Payments from participants, (2) Energy Grants, and (3) Operations and maintenance expense reductions. As stated by the Pennsylvania Public Utility Commission: [30]

> Program funding should be derived from the following sources:
> (i) Payments from CAP participants.
> (ii) LIHEAP grants.

[30] See § 69.265, CAP design elements. Pa. B. (172416) No. 218 Jan 93.

(iii) Operations and maintenance expense reductions.

This section of the study reports on funding from Low Income Home Energy Assistance Program (LIHEAP) grants. LIHEAP is a Federally funded program which provides grants to eligible consumers to offset home heating energy costs. In Pennsylvania, LIHEAP has two components – Cash grant and Crisis. The Cash grants are made to eligible consumers based on poverty level. The Crisis grant is made to eligible consumers who are without utility service or who have received a termination notice. With the exception of the 1996 Program, Crisis grants were also made to consumers who had made a payment arrangement with the utility and had a balance exceeding a pre-defined amount.

Congressional cuts in the LIHEAP program have resulted in shortening application intervals and lowering poverty level thresholds. For example, in 1993 eligibility was 150% of poverty. It was reduced to 135% of poverty in 1994, and further reduced to 110% of poverty in 1996.

The Energy Assistance Program (EAP) has been designed to encourage participants in applying for assistance. Although from a societal point of view, bringing in grant funds is considered neutral because it represents taking up a part of the customer payment shortfall with Federal funds administered through the state ("society" pays), from the point of view of the customer and of the utility these are payments from outside their own budgets which contribute directly to the bottom line. Because LIHEAP

**Table V-1: Grants Applied**

funds are awarded through the State from Federal funds, they are treated as a payment.[31]

◆ Does EAP help participants bring in more grants?

Theoretically, EAP participants should receive more and larger grants than non-participants due both to need (EAP participants are expected on the whole to be more in economic need than are other payment-troubled low-income customers who choose to participate in traditional approaches) and to the encouragement provided through EAP to apply for available funds (EAP participants are required to apply for the grants). However, the situation has become complicated because Congress has been successively cutting LIHEAP funding for the past several years.

The major effect of Congressional cuts has been to increase the difficulty in obtaining grants, but it has also complicated program management by causing a series of changes in the eligibility rules which can be confusing to customers, and which make planning difficult. Thus, an analysis which would have simply compared baseline year and participation, if LIHEAP funding had been constant or increasing, has to be adjusted to take into account the side effects of reduced funding levels.

GRANTS AMOUNT BROUGHT IN

[31] See Hill, Lawrence J. & Marilyn A. Brown, "Estimating the Cost-Effectiveness of Coordinated DSM Programs," *Evaluation Review*, Vol. 19, No. 2, April 1995, Pp. 181-196.

| BY CUSTOMER | | | | | |
|---|---|---|---|---|---|
| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
| | Year prior to EAP (Group 1) | Less than 12 Months Participation in EAP (Group 1) | Stable: First Full EAP Year (Group 1) | Stable: Two Full EAP Years (Group 3) | Qualified but never Entered (Group 2) |
| | No EAP pre-period | <12 Mo. EAP post-period | 12 Mo. EAP post-period | 12 Mo. EAP post-period | No EAP pre & post |
| | Group 1 | Group 1 | Group 1 | Group 3 | Group 2 |
| All Cases | 153.33 (n=221) | 194.97 (n=68) | 226.35 (n=153) | 238.82 (n=137) | 93.95 (n=258) |
| By Age | | | | | |
| Seniors (60+) | 118.11 (n=73) | 140.43 (n=7) | 154.44 (n=66) | 214.90 (n=87) | 106.65 (n=46) |
| Others | 170.70 (n=148) | 201.23 (n=61) | 280.90 (n=87) | 252.56 (n=50) | 91.20 (n=212) |
| By Poverty Level | | | | | |
| 0-50% | 233.84 (n=49) | 258.44 (n=18) | 360.03 (n=31) | 321.57 (n=30) | 210.78 (n=46) |
| 51-100% | 158.49 (n=100) | 185.26 (n=31) | 234.99 (n=69) | 257.23 (n=66) | 91.89 (n=129) |
| 101-150% | 91.36 (n=72) | 150.68 (n=19) | 136.91 (n=53) | 148.63 (n=41) | 32.41 (n=83) |
| Column 2 is information from the Baseline Year, for customers not in EAP. Columns 3 & 4 are for subsets of these same customers in the Participation Year. Column 5 is also for the Participation Year, but for a different set of customers, now in their second year as participants. Column 6 is for the Participation Year, for customers in traditional approaches. Use of only two actual 12-month years in the table helps compensate for the year by year reduction in LIHEAP funding. Table includes all grants, including LIHEAP and CRISIS. | | | | | |

As shown in Table V-1, for "All Cases", there was a pattern of increase in average grant amount applied with degree of commitment to the program. Thus, in their Baseline Year, customers received an average of $153.33, increasing to $194.97 for the Participation Year for customers in the program for less than twelve months, and to $226.35 for customers with a full twelve months of participation. As shown in column 5, a similar group of participants, with a full second year of participation brought in an average grant amount of $238.39. In contrast, those in the traditional approach brought in an average of $93.95 in grant funds during the Participation Year. This is as expected, since with the higher ability to pay

within each category, the comparison customers in column 6 would apply less for grant funds, and be less likely to qualify.

The Seniors (defined as 60 years of age and older) follow the same pattern, while the pattern breaks down somewhat for Non-Seniors ("Others"). When broken down by poverty level, the pattern is present but not consistent across all categories. However, the dependence of award amount on poverty level, as an assessment of need, is quite clear for each column.

As planned, and in spite of funding difficulties and changes in regulations, EAP participants are bringing in more grant funds in the Participation Year than they did in the Baseline Year, with an overall increase in average amount credited of $70.00 per full first-year participant. Participants in their second full year are approximately equivalent to first year participants in the overall average amount per customer credited (about $85 per full second-year participant over the Baseline Year customers in column 2) although the overall pattern is not completely consistent across categories.

The answer to the question, "Does EAP help participants bring in more grants?" is "Yes".

Section
6

# Energy Use During Program Participation

## Energy Consumption Analysis

### VI. Is there any Problem of Abuse of Energy Consumption?

One of the primary objectives of this study is to determine the relationship between energy consumption and EAP participation, since an increase in consumption associated with EAP participation could affect program success. This part of the study investigates whether or not EAP has the unintended side effect of inducing an increase in energy use among participants:

- The goal of the energy consumption analysis is to serve as an indicator of whether or not there is abuse of the program through significant increases in energy consumption on the part of participants.

Two methods were used to analyze the data, a pooled data or accounting approach and an individual case or statistical approach. The accounting approach yields the actual effect to the bottom line: "Considering all customers, is there more consumption?" The statistical approach yields the answer to the more academic question: "Considering customers with the "cleanest" data, is there an increase in consumption associated with program participation?" Program participant and non-participant groups are first compared overall. Then analysis is directed to subgroups.

## A. Customer Groups in the Study

Two 12-month time periods and three groups (two participant groups and one non-participant group) are compared in this study.[32] The *baseline year* is defined as the 12 months from October 1992 through September 1993. The EAP *participation year* is defined as the 12 months from April 1, 1994 through March 31, 1995.

### 1. EAP Participants

As noted, there are two participant groups. One consists of customers who were early enrollees in EAP who continue in the program through the participation year. The other consists of new enrollees who continue in EAP through the participation year. In addition, for some comparisons, the requirement of participation throughout the participation year is relaxed.[33]

NEW EAP

The new participant group comprised of customers who were not in EAP during the pre-period (the 12 month period prior to October 1, 1993). This group entered EAP during the window from October 1, 1993 through March 31, 1994.[34] In addition, the group was defined to require participation in EAP throughout the participation year.

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[32] Each group is a systematic random sample representative of the corresponding population from which it was drawn.

[33] The requirement for members of both participant groups to be present throughout the participation year is designed to provide the strongest test of hypothesis of abuse. This data requirement is specific to the consumption analysis and does not apply to other sections of the study.

[34] A one-sixth systematic random sample of 1,531 customers.

ONGOING EAP

This participant group is drawn from those customers active in EAP in October 1993, regardless of their enrollment date. This sample reflects all program participants at the end of September 1993. Members of this group also remained in EAP for the participation year.

### 2. Comparison Group

Two comparison groups were initially developed and reviewed for possible inclusion in the study, one based on records of payment problems, and the other based on receipt of LIHEAP at some time in the past. The LIHEAP group was found to be quite dissimilar in baseline consumption to each of the participant groups, and to the comparison group developed based on records of ability to pay. Since the LIHEAP group is dissimilar, it is a less appropriate comparison group. Also, income and some other customer information was not available for those who had received LIHEAP at some time in the past. For these reasons, only the non-participant group defined by income and expense records (ability to pay) is consistently used. [35]

## B. Method of Analysis

The data is analyzed using two separate approaches, a "pooled" or accounting approach and an individual case or statistical approach. Both approaches follow the same pattern of analysis.[36] They differ only in one respect, but this is a major difference: the accounting approach pools the cases into groups and analyzes each group as if it were a single case; the

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[35] LIHEAP group consumption is shown only in Figures VI-1 and VI-2.

[36] The design employed is the non-equivalent control group design, with selection operative in the participation groups. See Campbell, Donald T. & Julian C. Stanley, *Experimental and Quasi-Experimental Designs for Research.* Chicago, Rand McNally, 1966, P. 50.

statistical analysis treats each customer as an isolated case. This difference provides two distinct and complementary strategies to insure representative results. Since the two approaches have different strengths and weaknesses, if the results of the two approaches agree, the finding is very strongly supported.

### 1. Elements Common to Both Methods

The basis for both methods is the analysis of billing history. Billing analysis involves comparison of EAP participants to a comparison group of similar customers outside EAP. Energy use from customer billing records is assessed before participation to establish baseline energy use, and throughout the participation year. EAP participants are then compared to those in the comparison group to determine any net effect of the program.

Several data elements are used in the analysis, including a unique account identifier, billing histories, meter read dates, type of meter reading, daily temperatures and heating degree days. A standard computer program for weather adjustment of utility billing data, PRISM®[37], was used to weather normalize the data to derive an estimated Normalized Annual Consumption for the baseline year (NACpre), estimated Normalized Annual Consumption for the defined

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[37] The Princeton Scorekeeping Method, developed by the Center for Energy and Environmental Studies at Princeton University. Advanced Version 1.0 was used to analyze data for this study. PRISM® is a statistical procedure which produces a weather adjusted index of consumption used for billing analyses.

participation year (NACpost), and Gross change in energy consumption.[38] The result of controlling for weather is that the effect of participation in EAP is more clearly seen in the data, adjusting for the difference in degree days between the baseline year and the program participation year. Data was analyzed using the Statistical Package for the Social Sciences (SPSS).[39]

The specific steps in the analysis of change in energy consumption (Figure VI-1) are:

1. **EAP Participants: Consumption**

Separately compute average consumption for the baseline year and for the program participation year.

2. **EAP Participants: Gross Change**

Compute the gross change in consumption by subtracting usage in the selected participation year from usage in the baseline year.

3. **Comparison Group: Consumption**

Separately compute average consumption for the comparison group for the baseline year and for the time period of the defined participation year.

4. **Comparison Group: Gross Change**

Compute the gross change in consumption by subtracting usage in the selected participation year from usage in the baseline year.

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[38] Fels, M., The Princeton Scorekeeping Method: An Introduction. Princeton, New Jersey: Princeton University, Center for Energy and Environmental Studies, March 1984, PU/CEES 163. Fels, M., Special Issue Devoted to Measuring Energy Savings: "The Scorekeeping Approach," Energy and Buildings, Volume 9 (Combined Nos. 1&2), February/May, 1986.

[39] Nie, Norman H., C. Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner, & Dale H. Bent, *SPSS: Statistical Package for the Social Sciences.* New York: McGraw-Hill, 1975. The program versions are No. 6 & No. 7.

**Figure VI-1: Calculation of Gross Change in Normalized Energy Consumption (MCF)**

(1) EAP Participants: Consumption

| Base Year Energy | Program Year Energy |
|---|---|
| $(NACpre)_{EAP}$ | $(NACpost)_{EAP}$ |

(2) EAP Participants: Gross Change

$[(NACpre)_{EAP} - (NACpost)_{EAP}$

(3) Comparison Group: Consumption

| Base Year Energy | Program Year Energy |
|---|---|
| $(NACpre)_{Non\text{-}Participants}$ | $(NACpost)_{Non\text{-}Participants}$ |

(4) Comparison Group: Gross Change

$[(NACpre)_{Non\text{-}Participants} - (NACpost)_{Non\text{-}Participants}]$

## 2. The Difference between the two Methods

The pooled data and individual case approaches are quite similar in that they both follow each of the above four steps, and both are designed to yield representative results. However, the two approaches differ fundamentally in how they attempt to produce representative results. The pooled data approach yields a representative result based on the concept

of inclusion of all (or nearly all) cases.[40] The strategy of inclusion yields a bottom line result as an accountant might develop it. The statistical approach yields a representative result based on analysis of only "clean" data, a strategy of exclusion. This strategy of data exclusion – so that only "clean cases" are analyzed – is an attempt to remove the "noise" from the data in order to yield the underlying effect that might otherwise be masked due to the existence of only partial information on some customers, and other possible data irregularities.

### 3. Defining Abuse & the Mathematical Test of Abuse

If EAP participants show a high percentage of change towards increased energy use in the program participation year as compared to the baseline year, while the comparison group shows either a very low percentage increase or decreased use, there will be evidence of possible abuse. But if the program-treatment group and the comparison group show nearly the same percentage change, that is, if the difference between the two percentage changes is negligible, there will be no evidence of abuse. And, since there is a very high chance of detecting abuse if it is present, it is then also possible to show that there is no abuse.[41]

In order to perform the test of the difference between EAP Participants and the comparison group (the "difference of differences," or the *net* difference between the EAP Participant gross change from the baseline year to the participation year and the Comparison Group gross change

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[40] One "clean data" criterion was applied in the pooled data approach: each case was required to have at least six entries (real or estimated) for consumption for the baseline year and for the participation year. This criterion resulted in the exclusion of one case.

[41] With a very high probability. Perhaps a subtle difference, but one important to being very sure that results provide as firm a guide to practical action as possible.

from the baseline year to the comparison year), it is necessary to provide definition of the *direction* and *size* of difference which would constitute abuse of the program. At a general level, these dimensions may be introduced as follows:

> *Direction:* Considering the direction of the difference, for abuse to be present, the EAP Participants must show a net increase in consumption relative to the non-participants in the comparison group.
>
> *Size*: The size of the net difference which would constitute abuse is clearly a matter of judgment. To begin with an extreme example, it seems reasonable that a net difference between the change in the program group and the change in the non-participant comparison group of 50 MCF would definitely constitute abuse to any observer, but a difference of 2 MCF would definitely not.

Specifically, for this study, we will define abuse to occur only if all of the following three conditions are met:

(1) *Direction:* There is a net increase in use in a participant group relative to the change in energy use in the non-participant comparison group. Operationally, the result on this criterion is given by the direction of the net change in energy use. This first point in definition establishes the direction of increase relative to the comparison group.

(2) *Size of gross change in the participant group:* The energy use in a participant group is at least 110% in the participation year relative

to the same group's use in the baseline year. Based on the data shown later in this section (Table VI-1), this is operationally defined an increase of 16 MCF for the New EAP group or of 18 MCF for the Ongoing EAP group.[42] The use of a "110% rule" implements the consumption limits provision of the Policy Statement on Customer Assistance Programs.[43] Although the this provision is intended to apply to individual cases, it is applied in this study to each participant group as a whole.

(3) *Size of net change:* The increased use of energy in a participant group (calculated as in point two, above) is at least 110% of the use of the same group in the baseline year, after the gross change in energy use in the comparison group is first controlled for. Operationally, this is an increase of 12 MCF [16 + (-4)] for the New EAP group or 14 MCF [18+(-4)] for the Ongoing EAP group.[44] This refines the policy provision noted above to provide clearer resolution in measurement. As formulated, the policy on consumption limits applies to consumption which is first adjusted to remove the effects of weather. Using the non-participant comparison group developed for the evaluation, a second normalization step is logical: for each participant group, compute the net increase or decrease in consumption relative to the comparison group.[45]

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[42] The corresponding test level for gross change in the comparison group is 15 MCF.

[43] Section 69.265 (3)(iii), No. 218, January 1993, P. 172419.

[44] Using data in Table VI-1, row 3, column 5.

[45] An absolute MCF value, rather than a percent is used as a practical approximation since the usage in MCF for each group is the same order of magnitude.
*(footnote continued)*

A conclusion of no abuse of EAP follows only if all three points of the definition are met. [46]

## C. The Pooled Data Analysis: "Accounting Approach"

In the accounting approach,[47] pooling customer data within each group creates the equivalent of a single data case representing the total of homes in each group. Conceptually, this is the equivalent of treating all of the EAP participants as a single large EAP customer, and treating all of the customers in the non-participant comparison group as if they were a single large account customer.[48]

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[46] "No program abuse" is not the complete absence of program abuse on the part of any customer, but that the degree of abuse, if it occurs at all, is negligible for the group as a whole. Thus a practical person concerned with financial program control in the real world would say that there is no program abuse. If the difference between the mean of the EAP group and the comparison group is large and positive, then the "null" hypothesis is disproved: the conclusion would then be that there is abuse of the program. If the difference between the two group means is negligible, we have "failed to disprove the null hypothesis." Failure to disprove or "failure to reject" the "null" hypothesis of no program abuse is not philosophically the same as proving no program abuse. But the conclusion of no abuse follows statistically, if (1) there is a failure to reject the null hypothesis of no program abuse *and* (2) the power of the test is high. See Cohen, Jacob, *Statistical Power Analysis for the Behavioral Sciences*, Second Edition. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1988, Pp. 16-17.

[47] The "pooled data" or accounting approach is used in "near census sampling". Near census sampling is a method employed in management and organizational studies where (1) analysis groups are small, such as departments or work groups, and (2) computerized organizational records contain universal and easily accessible data elements. In such cases the alternative statistical sampling approach is less appropriate.

[48] From a competitive perspective, EAP might be conceptualized as if it were a residential low-income energy purchasing cooperative that bundled payment troubled customers. In this concept, EAP is like a product package including customer value and payment elements. The comparison group shows how the general market of payment troubled customers performs with EAP running concurrently as an option in the product mix.
*(footnote continued)*

By pooling the data, virtually all homes that have consumption data in both the baseline and participation periods are included in the analysis. So long as the customer is present in both periods, we can include a string of estimated reads, months of zero reads, and all of the other problems associated with the billing patterns of payment troubled customers.[49] For each of the aggregated "big customers," the pooled billing data, including actual and estimated meter readings, is then adjusted by calendar month. The pooled data for each pooled group is then weather normalized using PRISM®.

### 1. Why Pooled Data Analysis is useful for CAP-type Programs

Since their inception, programs for payment troubled customers have presented a special problem for program managers and evaluators concerning the measurement of change in energy use. When the effects of energy service programs are evaluated across customer groups that are consistent in their payments, the effects are comparatively simple to detect. Although usage may vary, consumption is fairly predictable, payments are regular, and the data series are complete from year to year. In contrast, payment troubled customers – just because they are payment troubled – tend to have more erratic payment and consumption records than the average customer.

Erratic payment and erratic consumption on the part of payment troubled customers yields both erratic and truncated data series for many of the individual customers in an analysis group. Unfortunately, the traditional

statistical approach has a strong requirement for "clean" data, so any instability in individual case data causes some proportion of individual customer "cases" to be deleted prior to the analysis. It is not unusual in the standard statistical analysis of non payment-troubled customers to lose 20% or more of cases from the analysis in the necessary data cleaning steps. This, of course, raises a problem for the representativeness of results for analysis of energy conservation programs for general residential customers.[50, 51]

The problem is more severe with payment troubled customers, where sometimes 50% of the data does not meet the individual case data quality requirements for the statistical analysis. Clearly, if 40%, 50%, or 60% of the representatively selected cases in a study must be deleted prior to performing the analysis, the results are likely not representative of the original group. This is so even though the original group was properly selected as a statistically random sample. The analysis is still useful, but

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[49] As noted earlier, one clean data criterion was applied to the pooled data analysis: at lease six reads (real or estimated) were required to be present in the case data for both the baseline year and the participation year.

[50] This problem has not been generally acknowledged in such studies. There are sometimes good reasons for this. For example, technology oriented studies can legitimately involve both real and virtual savings. In this instance, savings calculated based on the clean cases can be projected to the other cases as virtual savings. But the emphasis in CAP-type programs is not on technology, so the representativeness of results must be explicitly addressed.

[51] Evaluators have been working on these problems for several years in an effort to better match the method of analysis to the special characteristics of the available data. For example, Hirst, Goeltz & Trumble used a pooled data approach to analyze an electricity conservation program in which the problem was to characterize and compare separate communities. See, Table 15, p. 45 in Hirst, Eric, Richard Goeltz, and David Trumble (1987). *Electricity Use and Savings*, Final Report, Hood River Conservation Project. Oak Ridge, Tennessee: Oak Ridge National Laboratory, ORNL/CON-231, DOE/BP-11287-16.

it answers a different research question than determining the result for the group under study as a whole.

Thus, the pooled data of the "one big customer" analysis provides information more relevant to the bottom line focus of a business or regulatory perspective than the "cleaner" analysis by standard statistical methods. It is better because virtually all cases are included – it does not require deletion of a high proportion of the individual cases in the group due to a series of data quality screens. Instead, all cases, including cases which the statistical approach would treat as "bad" data, are melded into a single case. This case is the true record of actual customer consumption and payment behavior for a customer category group as a whole. It then corresponds virtually identically to the payment records from the customer accounting system.

Because the accounting approach achieves representative results through inclusion of nearly all cases, it can be useful to program managers and regulatory staff in providing an answer to a question, not well answered by the statistical analysis. While statistical analysis of the "clean" subset of data may yield better insight into how to modify a program in order to reach its yet unrealized potential, the accounting approach meets the need for practical performance information on the program as a whole. The statistical analysis can often better offer insights in answer to the question: "How could we do better?" The accounting analysis better answers the question: "How did we do?"

Answers to both questions are useful, so it is best to employ both approaches. When a statistical approach is employed without an accompanying accounting approach, the danger is that conclusions may

be drawn for the program as a whole on the basis of only the most well behaved customers.[52] Thus an accounting analysis provides a useful complement to a statistical approach in the analysis of CAP-type programs.

### 2. Results

Results of the pooled data analysis are shown in Figures VI-2 & VI-3, as well as in Table VI-1. Figure VI-2 shows the baseline weather normalized energy use. In this figure, it is clear that the older "ONGOING EAP" group has a higher annual consumption than the "NEW EAP" group.

Also evident in Figure VI-2 is the close correspondence of the baseline consumption of the non-participant comparison group to the baseline consumption of the NEW EAP group. Since the comparison group was defined from customer payment records similar to those of EAP participants, this similarity in energy consumption in the baseline year is as hoped for. This means that the non-participants selected on the basis of payment difficulties will be an excellent comparison group for the NEW EAP group and a workable comparison group for the ONGOING EAP customers. As Figure VI-2 also shows, as noted earlier, the baseline consumption of the LIHEAP non-participant group is not at all similar to the baseline consumption of either of the participant groups. The figure shows this clearly. As discussed above, for this reason, LIHEAP cannot

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[52] This is so even though the statistical result is accompanied by a confidence level and estimated precision of estimate. The statistical approach comes with associated confidence intervals, statistical power, and precision information. However, these are valid only if the input data is randomly representative of the population groups under study. Deletion of a high percentage of cases easily violates the assumption of representativeness of the results.

serve well as a comparison group in this study, and it is not used following the discussion in this section.[53]

**Figure VI-2: Baseline Period Consumption (MCF)**

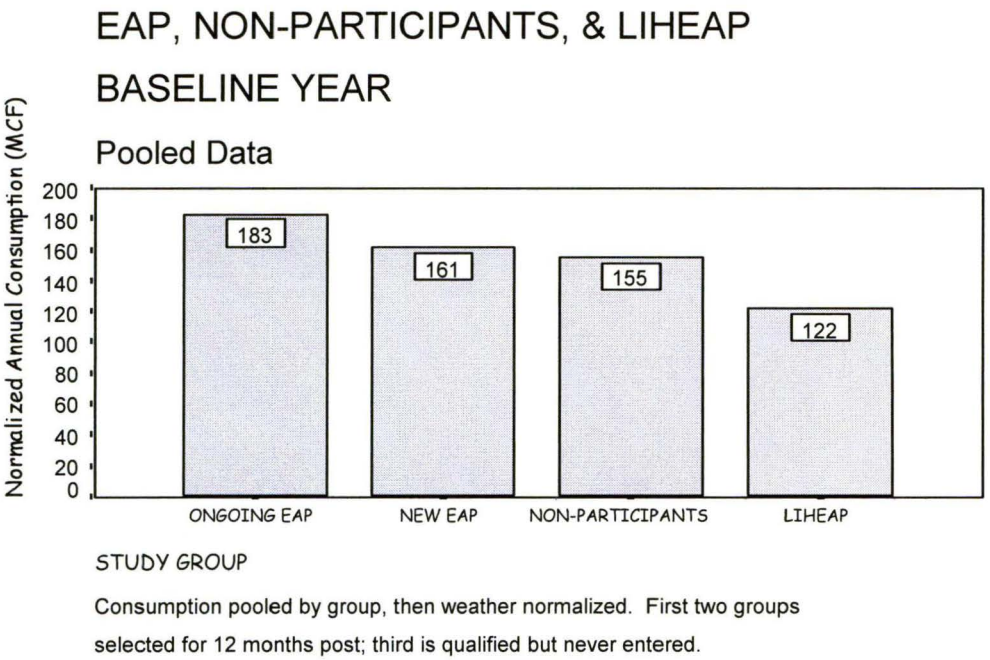


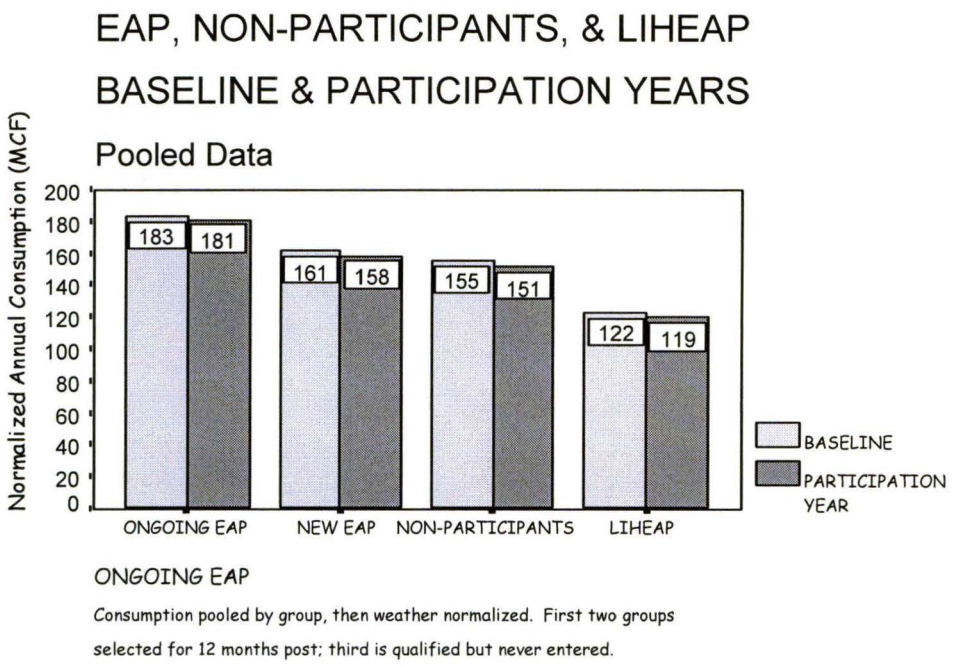

Figure VI-3 shows the comparison of the baseline period and participation period consumption of each EAP participant group, the payment troubled comparison group, and the LIHEAP group. In this figure, the first bar of each paired set represents the twelve months of the baseline year (twelve months ending in September 1993). The second bar shows energy use in the twelve months of the participation year, beginning in April 1994.[54]

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[53] The LIHEAP group, at 122 MCF in the baseline year is quite similar to the Equitable system-wide residential average consumption of 127 MCF.

[54] As specified earlier, the period from October 1993 through the end of March 1994 served as an "enrollment window" to assemble cases for the NEW EAP group.

**Figure VI-3: Participant Baseline & Participation Year (MCF)**




Thus, Figure VI-3 presents graphically strong evidence for the finding of no abuse of EAP:

1. *Direction:* For each group, the direction of the gross change in normalized energy consumption (MCF) from the baseline to the participation year is downwards.

2. *Size of gross change:* As can be seen in the figure, the difference in normalized energy use (MCF) between the baseline year and the defined participation year is *slight* for each group.

**Table VI-1: Gross Change in Energy Consumption**

| EAP PARTICIPANTS & COMPARISON GROUP<br>Pooled Data (MCF or Percentage) |
|---|

**Table VI-2: Management Control Report**

| Col. 1 | Col. 2 | Col. 3 (MCF) | Col. 4 (MCF) | Col. 5 (MCF) | Col. 6 (%) |
|---|---|---|---|---|---|
| Group | n | Mean (Baseline Year) | Mean (Participation Year) | Average Gross Change | Percentage Gross Change |
| ONGOING EAP (12 Mo. Post) | 283 | 183.41 | 181.20 | (2.21) | (1.20%) |
| NEW EAP (12 Mo. Post) | 153 | 161.31 | 158.07 | (3.25) | (2.00%) |
| COMPARISON GROUP | 257 | 154.98 | 151.11 | (3.87) | (2.50%) |

Results supporting Figures VI-2 & VI-3 are shown in Table VI-1. In this table, the average decline in energy consumption for each group in the study is shown in column 5. Since the baseline year consumption amounts vary, a better comparison is given by the percentage change in consumption from the baseline to the participation year (column 6). Equitable program control data, as shown in Table VI-2 shows a similar very slight decline in energy use. And, as shown in Table VI-3, the net change is negligible.

EAP STATISTICS
(Company Monthly Control Report)

| Month | N | Average Normalized Annual Usage |
|---|---|---|
| **1993** | | |
| January | --- | --- |
| February | 5513 | 183.1 |
| March | 5753 | 183.5 |
| April | 5933 | 183.8 |
| May | 5985 | 183.5 |
| June | 6090 | 183.2 |

# EAP STATISTICS
(Company Monthly Control Report)

| Month | N | Average Normalized Annual Usage |
|---|---|---|
| July | 6110 | 182.1 |
| August | 6170 | 182.0 |
| September | 6256 | 181.7 |
| October | 6355 | 181.9 |
| November | 6414 | 181.4 |
| December | 6440 | 182.0 |
| **1994** | | |
| January | 6415 | 181.0 |
| February | 6621 | 179.8 |
| March | 6714 | 179.3 |
| April | 6898 | 179.5 |
| May | 6972 | 181.0 |
| June | 6975 | 180.0 |
| July | 6695 | 179.3 |
| August | 6426 | 178.9 |
| September | 6143 | 178.2 |
| October | 5950 | 178.6 |
| November | 5805 | 179.1 |
| December | 5732 | 179.5 |
| **1995** | | |
| January | 5667 | 179.7 |
| February | 5655 | 179.4 |
| March | 5707 | 178.3 |
| April | 5932 | 177.9 |
| May | 6080 | 177.0 |
| June | 6141 | 177.4 |
| July | 6252 | 177.4 |
| August | 6284 | 177.3 |
| September | 6281 | 177.3 |
| October | 6318 | 177.1 |
| November | 6253 | 176.8 |
| December | 6165 | 176.8 |

**Table VI-3: Net Change in Energy Use**

| EAP NET CHANGE IN CONSUMPTION<br>Pooled Data (MCF) | | | |
|---|---|---|---|
| Col. 1 | Col. 2<br>(MCF) | Col. 3<br>(MCF) | Col. 4<br>(%) |
| Group | Gross<br>Change | Net<br>Change | Net<br>Change |
| ONGOING<br>EAP<br>(12 Mo. Post, n=283) | (2.21) | 1.67 | 0.59% |
| NEW<br>EAP<br>(12 Mo. Post, n=153 | (3.25) | 0.59 | 0.38% |
| Non-Participant<br>Comparison Group<br>(n=257) | (3.87) | --- | --- |

In summary, the accounting (pooled data) analysis has shown that:

1. *Direction:* The direction of the change for each group is toward decreasing energy use.

2. *Size of gross change:* For each group the size of the change in energy use relative to the group's respective baseline is very small (reductions of 1.2% to 2.5%).

3. *Size of net change:* The change in energy consumption of both EAP Participant groups, net of the absolute value of the gross change in the Comparison Group is negligible (an increase of four-tenths to six-tenths of one percent relative to each group's respective baseline).

## D. The Individual Case Analysis: "Customer as Unit of Analysis"

The second analysis approach is a statistical approach which examines only the "clean" subset of cases. As before, the analysis looks at subsets of individual homes, examining the consumption of the participant and non-participant groups in the pre and post periods. Also, as before, results are derived using a "pre/post" quasi-experimental design with a non-equivalent comparison group, the comparison group.[55] However, there is no pooling of data by group. Instead, *homes are kept as individual cases* throughout the analysis. With this approach data can be examined with reasonable confidence that consumption was estimated well on an individual customer level.

### 1. Why Individual Case Analysis is useful for CAP-type Programs

Individual case statistical analysis is the traditional approach to the analysis of differences in energy use. Its advantage is that it yields representative results based upon the analysis of only "clean" cases. Before analysis, all data is filtered through a series of data quality control screens. This quality control process screens out cases with incomplete or otherwise erratic data. Outliers in each data series are also adjusted prior to analysis.

Since the individual case analysis statistical approach is traditional, one of its strengths is that it is the standard method in current use for studies of similar programs. Perhaps the major feature which recommends this

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[55] As noted earlier, this is the non-equivalent control group design, with selection operative in the participation groups. Campbell, Donald T. & Julian C. Stanley, *Experimental and Quasi-Experimental Designs for Research*. Chicago, Rand McNally, 1966, P. 50.

approach is the integration of probability information with results, in particular statistical significance and statistical power.

### 2. Steps in Data Cleaning[56]

For the individual case analysis, Individual customer level data was 'cleaned' – case by case -- prior to using the PRISM® method. The actual and estimated meter data was prepared according to this method. All cases were included in the initial PRISM® run. Accounts with fewer than four actual meter readings in the 12 month period were dropped from

**Table VI-4: Data Loss in the Individual Case Approach**

| DATA LOSS (Number or Percentage of Cases) | | | | |
|---|---|---|---|---|
| Col. 1 | Col. 2 | Col. 3 | Col. 4 | Col. 5 |
| Group | Cases in Pooled Analysis | Cases in Individual Analysis | Cases Lost | Percentage of Cases Lost |
| ONGOING EAP | 283 | 212 | 71 | 25% |
| NEW EAP | 153 | 111 | 42 | 27% |
| Non-Participant Comparison Group | 257 | 192 | 65 | 25% |

[56] Note that this approach screens out the more erratic cases, mainly due to incomplete data series for individual customers, and assigns a lower consumption effect to extreme cases (outliers). The problem with the application of this standard method is that consistently payment-troubled customers by definition are likely to trigger these screens and it is quite likely that from an administrative perspective down-weighting extreme cases is not desirable. Or, at least, that managers and regulators would want to see the analysis both ways. The pooled data approach developed earlier does not screen the erratic cases and does not down-weight unusually high-use outliers.

the analysis. These cases have too few meter points for the individual customer level estimate of normalized consumption to be made.

PRISM® was run in the 'regular' mode with outlier detection on. Detected outliers were rerun using the 'robust' mode which down-weights the effects of outliers. The outliers are typically due to occupant behaviors which affect consumption, such as vacancies or temporary increases in household members. Down-weighting the effect of these data points on overall consumption, a "clean" estimate of normalized annual consumption (NAC) can be made.

The PRISM® output was further screened for data quality. Homes that fit the PRISM® model well provide the most accurate estimates. Cases which passed these screens in both the pre and post periods were used, while cases which are not well behaved were dropped from the analyses. The effect of the series of screens is shown in the percentage of cases lost (Table VI-4, column 5) in comparison to the earlier pooled data analysis.[57] This case loss represents the effect of the cleaning process in screening out cases which were not well behaved. The effect of the down-weighting of outliers is not shown, since these cases are included after adjustment. Once the subset of individual cases which survived the screens was determined, the analysis was carried out.

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[57] Note, however, that movers and other dropouts have been screened out prior to the pooled analysis (Table VI-4, column 2) by the requirement that cases analyzed in this section of the study be present in both the baseline and participation years.

## 3. Results

### a) Main Result: Finding of No Abuse

The results of the individual case analysis confirm those of the pooled analysis (the slight difference in the numbers is due to the screening of cases and the down-weighting of outliers applied in the individual case analysis):

1. *Direction of gross change:* For each group, the direction of the gross change is toward less energy use.

2. *Size of gross change:* The size of the difference between the two years is quite small for each group (Table VI-5, Column 5). These changes are on the order of two to three percent of the respective group baselines. Note that numbers from Equitable's ongoing monthly control report have been added to the table and show a similar result for an overall accounting of the program.

**Table VI-5: Gross Change in Energy Use**

GROSS CHANGE (MCF)
Individual Case Analysis

| Col. 1 | Col. 2 | Col. 3 (MCF) | Col. 4 (MCF) | Col. 5 (MCF) | Col. 6 (%) |
|---|---|---|---|---|---|
| Group | n | Mean (Baseline Year) | Mean (Participation Year) | Average Gross Change | Percentage Gross Change |
| ONGOING EAP | 212 | 175.33 | 172.4 | (2.93) | (1.67%) |
| Management Control Statistics* | 6144 | 181.9 | 177.9 | (4.00) | (2.2%) |
| NEW EAP | 111 | 160.02 | 157.33 | (2.69) | (1.68%) |
| Non-Participant Comparison Group | 192 | 151.30 | 147.22 | (4.08) | (2.70%) |

* Management Control Statistics from Table IV-2, Equitable Control Report, using identical time periods for measurement as defined for sample. For these control report statistics, the population size for one year ending October 1993 and the size for one year ending April 1995 were averaged.

**Table VI-6: Net Change in Energy Use**

| NET CHANGE (MCF)<br>Individual Case Analysis | | | |
|---|---|---|---|
| Col. 1 | Col. 2<br>(MCF) | Col. 3<br>(MCF) | Col. 4<br>(%) |
| Group | Gross<br>Change | Net<br>Change | Net<br>Change |
| ONGOING EAP (n=212) | (2.93) | (1.15) | 0.66% |
| Management Control Statistics* (n=6144) | (4.0) | 0.0 | 0.0% |
| NEW EAP (n=111) | (2.69) | (1.39) | 0.87% |
| Non-Participant Comparison Group (n=192) | (4.08) | --- | --- |
| ✶ Management Control Statistics from Table VI-2, Equitable Control Report, using identical time periods for measurement as defined for sample. The population sizes for one year ending October 1993 and one year ending April 1995 were averaged. | | | |

**Table VI-7: Statistical Significance of Gross Change**

| STATISTICAL SIGNIFICANCE:<br>Gross Change from Baseline Year to Participation Year | | | | | | |
|---|---|---|---|---|---|---|
| Group | Average Gross Change (MCF) | Standard Deviation (MCF) | Standard Error (MCF) | t-value | Degrees of freedom | Alpha (1-tailed) |
| ONGOING EAP | (2.93) | 21.80 | 1.50 | (1.96) | 211 | 0.026 |
| Management Control Statistics* | (4.0) | 21.80 (est.) | 1.50 (est.) | --- | 6143 | --- |
| NEW EAP | (2.68) | 21.08 | 2.00 | (1.34) | 110 | 0.091 |
| Non-Participant Comparison Group | (4.08) | 20.43 | 1.47 | (2.77) | 191 | 0.003 |
| Source: Computed using Statistical Package for the Social Sciences, T-Test procedure for paired samples.<br>✶ Management Control Statistics from Table VI-2, Equitable Control Report, using identical time periods for measurement as defined for sample. The population sizes for one year ending October 1993 and one year ending April 1995 were averaged. | | | | | | |

3. *Size of net change:* The change of each participant group relative to its baseline, corrected for the absolute value of the change in the comparison group is about one percent, with a value of approximately

one to two MCF. In other words, the size of the net increase is so small as to be negligible.

4. *Statistical Significance:* For both Ongoing EAP and New EAP (Table VI-7), an effect is detected, but the effect is small in size and its direction is desirable (away from abuse). Thus the significance tests fail to confirm the hypothesis of abuse. The Management Control Statistics which are population figures for EAP (row 2) also support this sample result.

5. Statistical power: What about the chance of detecting a meaningful effect if it existed? The statistical *power* of each test of gross change is high. As shown in Figure VI-8, the power of the test is 99% or better for each EAP group. This means that there is a 99% probability or better in the case of either EAP group to detect the gross differences defined as abuse (16 MCF for New EAP and 18 MCF for Ongoing EAP). When the differences are adjusted to net out the effect of the absolute change in MCF in the comparison group (12 MCF for New EAP and 14 MCF for Ongoing EAP, see point 3 on page 61) the result is also a power level of 99% for each group. Thus the finding that there is no abuse of Program is true with a probability of 99%.[58]

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[58] This positive finding is based on the probability of finding abuse if it were present, and the agreement of each of all analyses: direction, size, statistical significance, statistical power, and population statistics. It is not based solely on failure to find a statistically significant result (see "A Common Misinterpretation" P. 111 in Phillips, John L. Jr., *How to Think About Statistics*, Fifth Edition. New York: W.H. Freeman and Company, 1996), but on power analysis (see Jacob Cohen, *Statistical Power Analysis for the Behavioral Sciences*, Second Edition. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1988, Pp. 16-17).

**Table VI-8: Statistical Power**

| POWER ANALYSIS:[59] 99% Confidence, One-Tailed "t" Test | | | | |
|---|---|---|---|---|
| Groups | $n_1, n_2$ | Difference of Means (MCF) | Standard Deviation (MCF) | Power |
| NEW EAP, testing a gross effect size of 16 MCF | 111, 111 | 2.69 | 21.08, 21.08 | 0.99 |
| ONGOING EAP, testing a gross effect size of 18 MCF | 212, 212 | 2.93 | 21.80, 21.80 | 0.99 |
| Non-Participants, testing a gross effect size of 15 MCF | 192, 192 | 4.08 | 20.43, 20.43 | 0.99 |
| NEW EAP, testing a net effect size of 12 MCF | 111, 192 | (1.39) | 21.08, 21.08 | 0.99 |
| ONGOING EAP, testing a net effect size of 14 MCF | 212, 192 | (1.15) | 20.43, 20.43 | 0.99 |

The analysis above concludes the study of possible abuse of consumption in EAP. Results of the pooled data analysis, of the individual case analysis, and the review of management control statistics are all in accord. There is no abuse of consumption by EAP participants.

### b) Breakout of Results by Sub-group

The remainder of the statistical analysis develops particular breakouts of the EAP participants and of the comparison group: by poverty level, by high consumption, and by proportion of seniors.

#### (1) Consumption by Poverty Level

Poverty level data was available on the basis of information provided by customers in connection with payment problems. As can be seen in Table VI-9, both participant groups and the comparison group have basically similar percentages of customers at the middle poverty level (48%, 52%, 47%). However, the ONGOING EAP participant group is weighted slightly more toward the lowest poverty category ("Less than or equal to 50%" of Federally defined poverty) with about 22% at this lowest level in comparison with 15% for the NEW EAP participant group. The NEW EAP participant group is weighted slightly more toward the top poverty category ("More than 100% but less than or equal to 150% of Federally defined poverty) with 37% of its members at the top level in contrast with 31% of the members of the ONGOING EAP participant group. The comparison group is in between on both comparisons. This shows that the group of non-participant payment troubled customers functions well as a comparison group in its poverty breakdown. Also, it

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[59] The Power analysis method is given by Jacob Cohen, *Statistical Power Analysis for the Behavioral Sciences*, Second Edition. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1988. See Chapter 2. The calculations were performed using Michael Borenstein & Jacob Cohen, *Statistical Power Analysis: A Computer Program.* Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1988. A check calculation was then performed using a second statistical software package, *nQuery Advisor*™, version 1.0, gave the same results. Elashoff, Janet D., *nQuery Advisor User's Guide*. Los Angeles, California: Dixon Associates, 1995.

**Table VI-9: Poverty Level Breakout**

suggests slightly greater economic need among the members of the ONGOING EAP group than among the members of the NEW EAP group.

In Table VI-10, the two participant groups and the comparison group are compared across poverty levels, with percentage changes rounded to the

| PERCENTAGE OF CUSTOMERS BY POVERTY LEVEL[60] (within Group) | | | |
|---|---|---|---|
| Column 1 | Column 2 | Column 3 | Column 4 |
| | (12 Mo. Post) | EAP Qualified | (12 Mo. Post) |

**Table VI-10: Energy Consumption by Poverty Level**

| Post-period Federal Poverty Level | NEW EAP (%) | COMPARISON (%) | ONGOING EAP (%) |
|---|---|---|---|
| 0-50% | 17 (15%) | 31 (16%) | 47 (22%) |
| 51-100% | 53 (48%) | 100 (52%) | 99 (47%) |
| 101-150% | 41 (37%) | 61 (32%) | 66 (31%) |
| Total Customers | 111 (100%) | 192 (100%) | 212 (100%) |

| CUSTOMER CONSUMPTION BY POVERTY LEVEL (within Group) | | | |
|---|---|---|---|
| Column 1 | Column 2 | Column 3 | Column 4 |
| | (12 Mo. Post) | EAP Qualified | (12 Mo. Post) |
| Post-period Federal Poverty Level | NEW EAP | COMPARISON | ONGOING EAP |
| 101-150% | *n=41* | *n=61* | *n=66* |
| Baseline (MCF) | 173.64 | 172.24 | 175.26 |
| Post-period (MCF) | 169.69 | 164.07 | 174.50 |
| Change (MCF) | 3.95 | 8.16 | 0.76 |
| Change (%) | 2% | 5% | 0% |
| 51-100% | *n=53* | *n=100* | *N=99* |

[60] Note that the poverty breakout is only for customers included in the consumption analysis. This analysis has tighter data restrictions (*e.g.*, on meter reads) than analyses in other sections of the study.

| | | | |
|---|---|---|---|
| Baseline (MCF) | 153.85 | 147.66 | 176.26 |
| Post-period (MCF) | 151.55 | 145.43 | 172.91 |
| Change (MCF) | 2.29 | 2.23 | 4.02 |
| Change (%) | 1.5% | 1.5% | 2% |
| 0-50% | *n=17* | *n=31* | *N=47* |
| Baseline (MCF) | 146.42 | 121.86 | 172.05 |
| Post-period (MCF) | 145.56 | 119.84 | 168.36 |
| Change (MCF) | 0.86 | 2.02 | 3.69 |
| Change (%) | 1% | 2% | 2% |
| Total Customers | 111 | 192 | 212 |

nearest one-half percent. The direction of change toward decreased consumption is uniform across groups and poverty levels. The size of change is very small, ranging from less than one-half percent up to 5%. This variation is not meaningful because data does not permit normalization by housing type or size.

(2) High Consumption Customers

If "high usage" is defined as use of 200 MCF or more annually, the percentage of high consumption customers ranges from 11% in the comparison group to 16% in the NEW EAP group, to 24% in the ONGOING EAP group (Table VI-11). As indicated in this table, the assignment of limited weatherization resources appropriately follows the pattern of high usage consumption among groups.[61]

**Table VI-11: High Consumption Customers**

| HIGH CONSUMPTION CUSTOMERS (in both Pre & Post Periods) | | | |
|---|---|---|---|
| | NEW EAP | COMPARISON | ONGOING EAP |
| High Use (% of Total Customers included in Consumption Analysis) | 18 (16%) | 21 (11%) | 50 (24%) |
| High Use with Weatherized/Pending (% of High Use) | 4 (22%) | 3 (14%) | 20 (40%) |

[61] The calculation includes customers who were high users in both the baseline year and in the participation years (but not in only one year).

| | | | |
|---|---|---|---|
| Total Customers | n=111 | n=192 | n=212 |

(3) Seniors

One of the questions which naturally occurs in studying groups of payment-troubled customers is the proportion of each group which might be classed as composed of senior citizens. We know that older persons tend to have income related problems due to continuing inflation of the US dollar, and the fact that pensions tend to be fixed, entitlement funds continue to be ever more stretched as American poverty increases, and entitlement funds in any case lag the increases in the relative costs of goods and services. As shown in Table VI-12, the percentage of seniors in the two participant groups is more than double the percentage in the comparison group.

**Table VI-12: Seniors**

| SENIORS[62] (Persons aged 60 and above) | | | |
|---|---|---|---|
| | NEW EAP | COMPARISON GROUP | ONGOING EAP |
| Seniors (% of Total Customers) | 55 (50%) | 38 (20%) | 91 (43%) |
| Total Customers | n=111 | n=192 | n=212 |

(4) The ONGOING and NEW EAP Participants

[62] Comparisons in this table, as in all tables in this section of the study are among customers (a subset) who fit the more strict data requirements of the consumption analysis.

Although the contrast between the ONGOING EAP and NEW EAP groups has been implicit in the discussion to this point, it is interesting to directly summarize some of the differences between these participant groups. First, as was shown in the pooled analysis (Figure VI-2), the baseline year usage of the ONGOING EAP group is about 183 MCF, while the baseline year usage of the NEW EAP group is approximately 161 MCF, a difference of 22 MCF. In the individual case analysis (Table VI-5) the ONGOING EAP showed a consumption of 175 MCF while the NEW EAP group had a consumption of 160 MCF in the baseline year, a difference of 15 MCF. The common result is that the ONGOING EAP group has a higher usage than the NEW EAP group.

The ONGOING EAP group has a somewhat higher percentage at the lowest poverty level, and a somewhat lower percentage of cases at the highest poverty level as compared to the NEW EAP group (Table VI-9). The ONGOING EAP group has a higher percentage of high use customers than does the NEW EAP group (Table VI-11). It also has a slightly lower percentage of seniors (Table VI-12).

In summary, the ONGOING EAP group uses more energy, is poorer, has a slightly lower percentage of seniors, and has a higher percentage of high use customers than the NEW EAP group.

## E. Recommended Action

Since the finding in the consumption analysis is that there is no abuse of the EAP, the recommendations regarding consumption are not suggested as essential actions, but rather as steps which might be helpful in continuing management of the program and in future analysis. Of the five minor recommendations, the first three are probably not difficult to implement. The last two of the five minor recommendations may be impractical. Still, they may be seen as sensitizing recommendations, so

that, for example, if there are other changes underway in the customer accounting system, perhaps these suggestions regarding data can be reviewed and considered at such a time.

### 1. Five Minor Recommendations

1. The possibility of abuse of consumption, of course, must be checked from time to time. Addition of a year against prior year % change of average normalized annual usage to the monthly *EAP Statistics* control report might be of use in this regard.

2. A second addition would be the creation of a reporting format which organizes participants by their half-year entry groupings, each compared on a normalized annual basis to its one-year pre-program normalized baseline.[63]

3. Another useful monthly comparison would be to include a normalized year against prior year % change in normalized annual consumption for the pool of customers not in the program, who are identified from payment information as being potentially eligible.

4. Collect and record housing type and housing size data (square feet or number of rooms). A limiting factor in the consumption analyses, both in the pooled and individual case approaches, is the absence of house size data and housing type data. Without knowing the size of the housing stock and further normalizing results by size, the differences in consumption between participant groups and the comparison group cannot be normalized by

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[63] Due to the difficulty of capturing back data that may have been already downloaded to microfiche, if a half-year group report is implemented it should be developed prospectively, for example, perhaps beginning with the October 1996 through May 1996 entry group.

housing type or size of home. If the average size and condition of the housing stock for the EAP participant tends to be different than for the non-participant, it will affect the actual consumption and the outcome of the analyses. Likewise, housing types greatly influence consumption. Single family homes do not 'behave' in the same manner as apartments and mobile homes. Consumption analyzed on a square foot basis, and sorted by housing type, tends to more accurately report the similarities and differences between groups. Future consumption analysis utilizing this information will provide additional insight into the differences and similarities between groups, and will result in more accurate comparisons between groups. In addition to more accurate analyses, this data could provide the kind of reporting and customer information referred to in the Process Evaluation, recommendation 8, page 12.

5. Classify data by senior status and number of residents. Ease of access to information regarding senior citizen status, and number of residents would also be useful for future analysis. If, at some future time, an opportunity arises to modify Equitable's customer accounting system, collection of this information would be useful.

## 2. Major Recommendation

1. Expand and focus weatherization activity. The relative number of participants weatherized is small. A CAP-type program must be focus on payment. And, weatherization takes place under the separate LIURP program. Still, CAP-type programs could benefit from an increased focus on usage reduction/weatherization. Priority under LIURP to EAP customers who have been in the program for at least one year might be cost-effective due to the stability of this customer group. Such a priority would probably require a full or partial waiver to authorize treating high-use EAP

customers with one year in the program before other high-use customers with problems. Alternatively, EAP could have its own special baseload reduction component to see what can be done to reduce energy needs of a small number of high-use homes each year.

This recommendation to increase and to more intensely focus the usage reduction/weatherization effort coincides with the expectation that with a sustained learning effort in the field, usage reduction will become increasingly effective in reducing consumption. Also, because weatherization funding is limited and not all homes will receive these services, it is recommended that the conservation education component of the EAP program be reinforced. A pilot education program was outlined in the Process Evaluation, page 16.

To anticipate the basic finding of this study, the EAP program is working well and a focused pilot on further reducing the need for energy could make EAP work even better.

Section
7

# VII. Comparative Administrative Cost

Programs, of course, cannot be run without administrative cost. And, even the absence of a program will lead to the incurring of administrative costs. One of the concerns regarding any program is cost of administration versus the cost of administration of realistic alternatives.[64]

◆ The goal of the analysis of administrative costs is to determine the administrative cost of EAP in comparison with the administrative cost of traditional methods of credit and collection.

## A. Method of Analysis

The basic problem is to compare the cost of *traditional* approaches to credit and collection for payment-troubled customers and the *alternative* cost of offering an Energy Assistance Program (EAP) for those low-income payment-troubled customers who are initially willing and able to respond to EAP pricing, and then continue to meet the conditions and requirements associated with EAP pricing. Two approaches are used. The first is a "bottom up" approach which has been traditionally used in evaluation studies of this kind. The second is a "top down" approach which is consciously designed to resemble the kinds of considerations which are taken into account in the annual departmental budget cycle.

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[64] This section deals only with comparison of administrative cost. A consideration of full benefits and costs is presented in Section IX.

The top-down method is adopted following a discussion of the two approaches.

### 1. Bottom-Up Approach

In reviewing previous studies of CAP-type programs, the method of cost analysis generally employed begins by developing the costs of the alternative (here EAP). Then, an attempt is made to isolate the individual costs of activities associated with traditional approaches to credit and collection for low-income payment-troubled customers, by means of estimating costs of individual (unit) activities to form an aggregate cost. And then, the two are compared. There are both strengths and weaknesses in this approach.

#### a) Strengths

The strength of the bottom-up approach is in identifying the costs of the new program alternative (here EAP). These costs are, after all, easy to identify. Ease in identification is due to the fact that a new program is noticed. The costs stand out because they were not in the departmental budget or in the budgets of service departments in the prior year. Also, none of the new costs have as yet been accommodated by inclusion in "off-project" services or budgets.

New costs are especially visible when there is a use of outside service companies, such as community-based organizations (CBOs) and consulting, administrative, or collections agencies in developing, implementing, and operating new projects. These outside agencies necessarily include all overheads and productivity factors in the bottom line bid price. Thus the costs of the new program (here EAP) tend to be accurate. There are no missed administrative, support, or overhead

costs. Even if costs are not correct by category or line item (more often the case than not), the bottom line will be correct.[65] Thus, new project costs (1) will necessarily be included in the bid prices of outside service providers, and (2) will necessarily be brought forward by internal departments, such as computer services, since to the staff of related service functions new activities will appear as associated with new and discrete cost increments.[66]

b) Weaknesses

As may be obvious, the weakness of the standard approach is in the costing of the traditional service effort. Historically, the "Credit and Collections" function has existed approximately for the same duration as the utility. For the first utilities of the Atlantic states, this means that practices which made perfect sense when the utility was founded, or during a past decade when the cost reporting of such areas as "Customer Service" or "Credit and Collections" was last systematically reviewed, continue over the years. They are integral to the yearly cycle of cost accounting and reporting. This system (as developed for firm level regulatory and financial reporting) works, so it is not changed.

Thus, while costs are properly accounted into overall FERC categories, utility accounting systems were never intended to support individual project-level testing of costs of traditional operations versus a mix of

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[65] The bottom line of a vendor bid must contain all costs, and is reliable. In practice, the individual line item amounts which total to the bottom line are not, even if a formal requirement.

[66] Many utilities track costs only at high levels and in broad categories. For these utilities the "activity center" which serves as cost center is at the VP level. A few utilities have new computer assisted accounting systems which track at the project level. In either case, new projects will be noticed and their incremental costs will be easily identified.

alternatives. The kind of demand placed upon cost accounting by program evaluation is very unusual in the ongoing routine of business. The level of cost information required, and particularly the routine accounting of cost by low-level activity is usually not present prior to the information requests posed by program-level evaluation. Capturing the level of costs required for evaluation easily becomes an impractical project, because the amount of person-effort required is prohibitive.

Yet, the bottom-up approach misses significant costs of traditional operations. While fully adequate for traditional accounting purposes, utility cost tracking is simply not designed to facilitate direct "what if" testing of the rationality of traditional costs at the program or project level. And, over the years, critical support costs for an operation can become institutionalized in other budgets, and so be missed. Finally, the bottom-up approach depends on developing a comprehensive list of cost categories. By the nature of this task, it is quite possible for some of the relevant categories to be missed.

Not only are cost categories missed, but the "productivity factor" is often left out in bottom-up accounting. For example, a study of activities relevant to credit and collections might accurately state the time and cost of issuing a collections letter, but leave out the fact that one-fourth of the day's work time is not accounted for by directly relevant work tasks for which per unit costs are developed. The missing element is the productivity factor.

### 2. Top-Down Approach

In contrast to the bottom-up approach, the model for the top-down approach is straightforward and simple. It is the utility annual departmental budget cycle. The difference between the two approaches can be emphasized by imagining what would happen if a departmental

manager were to use the "bottom up" approach (the only information available in many program evaluations) to determine the departmental budget for the following year. The "bottom-up" approach begins by identifying work activities, and then breaking them into units – similar to a time and motion study. This might include such items as numbers of letters to the average payment-troubled customer, cost per letter in time, postage, paper, etc. Yet, anyone who has managed a department or work group through the annual budget cycles of a large corporation will be familiar with the fact that working up an annual budget from the per unit costs of productive activities could easily yield a budget that would cause the department to run out of funds by the third quarter, or even by the middle of the year.

For the evaluation, what the top-down approach captures easily, but the bottom-up approach easily leaves out are:

(1) Overheads.

(2) The 'productivity factor'.

(3) Support services (traced and assigned as appropriate to the cost of traditional approaches to credit and collections).[67]

The best way to capture these hidden costs is to avoid the bottom-up approach and use the top-down approach if at all possible.

## B. Results

For the bottom-up approach, traditional costs include all transactions such as letters, agreements (cost of setting payment arrangements), changes

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[67] For example, some utilities have centralized and partially automated the collections function. Computer assisted call centers, and computer generation of standard collection letters may appear to reduce the staffing costs of traditional approaches to collection, and thus lower the cost per letter. But both re-organization projects and computer projects typically have high costs, not accounted to credit and collections budgets. From an evaluation perspective, all such costs should be assigned to the operations which they impact.

COST CATEGORIES

**Table VII-1: Cost Categories included in Top-Down Approach**

Labor
Non-Union
Union
Benefits

All Other Collection Budget
Materials & supplies
Transportation
OCM maintenance and telephone charges
Collection fees/commissions
Collection contractors
PC & photocopy rental

Additional Collection Charges
Credit reports
Computer - forms
Computer -other
Bankruptcy recovery - legal fees
Legal
Customer Service customer negotiations
Telephone
Postal Meter Allocation
Consumer Credit Counseling
Service Reconnections
BCS Complaints (Service Terminations)

in agreements (cost of changing payment arrangements), high bill complaints, complaints to the Pennsylvania Public Utility Commission, bill messages, and costs associated with service termination and reactivation. For the top-down approach, costs associated with the traditional approach are allocated from departmental and company-wide budget records. Cost categories allocated are shown in Table VII-1.

In the top-down approach, because actual budget categories and accounting records serve as the basis for allocation, overheads and

**Table VII-2: Bottom-Up Results**

support services from other departments are included. Also, the productivity factor is automatically included, just as it is included in the bottom-line bid price for a service vendor. Through this method, both EAP (as a new project, with very visible costs), and the traditional approaches to collections (for which cost categories and cost amounts are not easily isolated) are treated in the same manner and there is a good chance that all costs are captured for both EAP and the traditional approaches to credit and collections for payment-troubled customers.

Results of the bottom-up and top-down approaches are shown in the contrast of Table VII-2 and Table VII-3. The bottom-up results shown in Table VII-2 are typical of the best results obtainable from utility records using this approach and are typical of administrative costs calculated for CAP-type evaluations. The top-down results shown in Table VII-3 were developed working with the Corporate Comptroller and implementing the practical cost allocations used in the annual budget cycle plus allocations of related costs identified in the budgets of support departments.

Since both the bottom-up and top-down approaches use a net cost calculation, there is some correction for the lack of adequate cost accounting in the bottom-up approach. But the corrective tendency inherent in net figures is not strong enough in this case to make the resultant bottom-up results useful. This is because, as expected, the ability to capture costs of the alternative program (EAP) are about equal in both bottom-up and top-down approaches (column 3 of each table),

ADMINISTRATIVE COST
PER CUSTOMER
(Bottom-Up)

| Column 1 | Column 2 | Column 3 | Column 4 |
|---|---|---|---|
| | Baseline | Participation | |

**Table VII-3: Top-Down Results**

| | Year | Year | Difference |
|---|---|---|---|
| All New EAP Customers (Group 1, n = 221) | | | |
| Traditional Collections Cost | 20.62 | 12.11 | |
| EAP Monitoring | 0.00 | 43.60 | |
| Enrollment | 0.00 | 28.68 | |
| Total | 20.62 | 84.39 | (63.77) |
| At least Some First Year Participation in EAP (Group 1, n = 68) | | | |
| Traditional Collections Cost | 31.49 | 27.19 | |
| EAP Monitoring | 0.00 | 20.18 | |
| Enrollment | 0.00 | 28.68 | |
| Total | 31.49 | 76.05 | (44.56) |
| Stable Full Year Participation in EAP (Group 1, n = 153) | | | |
| Traditional Collections Cost | 15.71 | 5.41 | |
| EAP Monitoring | 0.00 | 54.00 | |
| Enrollment | 0.00 | 28.00 | |
| Total | 15.71 | 87.41 | (71.70) |
| Stable Second Full EAP Year (Group 3, n = 137)[1] | | | |
| Traditional Collections Cost | 15.71 | 0.82 | |
| EAP Monitoring | 0.00 | 54.00 | |
| Enrollment | 0.00 | 0.00 | |
| Total | 15.71 | 54.82 | (39.11) |
| Qualified but never Entered (Group 2, n = 258) | | | |
| Traditional Collections Cost | 14.56 | 16.76 | |
| EAP Monitoring | 0.00 | 0.00 | |
| Enrollment | 0.00 | 0.00 | |
| Total | 14.56 | 16.76 | (2.20) |
| (1) Assumes same baseline cost as previous year would have applied if participation had not continued for the second twelve months. | | | |

while the ability to capture the costs of the traditional approach to credit and collections is poor in the bottom-up approach and accurate in the top-down approach (compare column 2 of each table). Although there is some variation, the bottom-up approach captures only about one-fourth

| ADMINISTRATIVE COST PER CUSTOMER (Top-Down) | | | |
|---|---|---|---|
| Column 1 | Column 2 | Column 3 | Column 4 |
| | Baseline | Participation | |

| | Year | Year | Difference |
|---|---|---|---|
| All New EAP Customers (Group 1, n = 205) | | | |
| Traditional Collections Cost | 81.47 | 22.26 | |
| EAP Monitoring Cost | 0.00 | 46.77 | |
| Enrollment | 0.00 | 28.00 | |
| Total | 81.47 | 97.03 | (15.56) |
| At least Some First Year Participation in EAP (Group 1, n = 93) | | | |
| Traditional Collections Cost | 114.34 | 72.36 | |
| EAP Monitoring | 0.00 | 25.90 | |
| Enrollment | 0.00 | 28.00 | |
| Total | 114.34 | 126.26 | (11.92) |
| Stable Full Year Participation in EAP (Group 1, n = 183) | | | |
| Traditional Collections Cost | 66.87 | 0.00 | |
| EAP Monitoring | 0.00 | 54.00 | |
| Enrollment | 0.00 | 28.00 | |
| Total | 66.87 | 82.00 | (15.13) |
| Stable Second Full EAP Year (Group 3, n = 137)[1] | | | |
| Traditional Collections Cost | 66.87 | 0.00 | |
| EAP Monitoring | 0.00 | 54.00 | |
| Enrollment | 0.00 | 0.00 | |
| Total | 66.87 | 54.00 | 12.87 |
| Qualified but never Entered (Group 2, n = 258) | | | |
| Traditional Collections Cost | 84.97 | 80.99 | |
| EAP Monitoring | 0.00 | 0.00 | |
| Enrollment | 0.00 | 0.00 | |
| Total | 84.97 | 80.99 | 3.98 |
| (1) Assumes same baseline cost as previous year would have applied if participation had not continued for the second twelve months. | | | |

of actual administrative costs of traditional approaches to credit and collections as does the top-down approach.

This difference becomes important in understanding the impact of administrative costs. As shown in the top-down approach of Table VII-3, those customers who enter EAP and are stable for one full year in EAP show a net administrative cost of $15.13 above the baseline year. But those who stay two years return $12.87 in lower administrative costs in the second year, so that the net cost over two years is $2.26.

Although this study does not extend to the third year, we can project an additional administrative net savings by EAP of $12.87 in the third year for those who remain in the program. Thus there is a net advantage to EAP of $10.61 per customer for customers retained three years. We have not measured three year program retention in this study, but we do know that retention is about 70% for one year, and drops only to 68% of the original applicants for two years. The small drop between the first and second full year suggests very strong stability. Assume the third year figure is 65%. Then, for each 100 customers entering EAP, the 65% retained for three years would return $689.65 in net administrative cost reduction (65 x $10.61). For those who remain in EAP, these savings would increment over future years.

For customers who drop out of EAP, it must be taken into account that these customers also fail in traditional approaches to credit and collections. The increased cost caused by these customers in traditional approaches to credit and collection begins to be indicated in Table VII-3, for customers with "At least Some First Year Participation in EAP". As shown in column 2, the Baseline Year cost of traditional collections for this group is considerably higher than that of any other group. Thus, even though their total cost in the EAP Participation Year is high, since their cost in the Baseline Year is also high, the difference is not large (column 4). The cost item which causes the net increase in cost for customers who drop out and then cycle back through re-enrollment is the cost of each re-enrollment.

This suggests a need to study the cost of those customers who drop out of EAP, over a several year period in order to increase knowledge of both their EAP and traditional costs.

Section 8

Table VIII-1: Arrearage Amounts

## VIII. Arrearage

Arrearage necessarily figures in to cost analysis of payment-troubled customers. Yet, there is no arrearage forgiveness component in the Energy Assistance Program (EAP), and progress in reducing arrearage is necessarily slow. For payment-troubled low-income customers, it is much to ask that the current bill be met. To add the goal of reducing arrearage is not to ask the impossible, but it is to ask very much. Thus any program effect on arrearage reduction will necessarily be quite small. Still, the question for analysis in the section of the report is, "Does EAP help reduce arrearage?"

- Does EAP help reduce customer arrearage amounts?

### A. Method & Results

Summary figures for arrearage were calculated using the beginning balance at the onset of the Baseline and Participation Years, and the balances at the end of the Baseline and Participation Years. The amount of arrearage in March of the Baseline Year and at the end of the Participation Year (March '95) are shown in Table VIII-1.

This table is useful for inspecting the range of arrearage by group at the end of a heating season when arrearages are as high as they will get during the year. The arrearage amount at the end of each month has a

| ARREARAGE AMOUNT PER CUSTOMER | | | |
|---|---|---|---|
| Column 1 | Col. 2 | Col. 3 | Col. 4 |
| | n | March '93 | March '95 |
| All New EAP Customers (Group 1) | 221 | 819.47 | 1042.94 |
| At least some Participation in EAP (Group 1: Less than 12 months in EAP) | 68 | 1157.52 | 2008.93 |
| Stable Full Year Participation in EAP (Group 1: Full 12 months in EAP) | 153 | 669.23 | 613.61 |
| Stable Second EAP Year (Group 3: Full 12 months in EAP) | 283 | 835.21 | 799.39 |
| Stable Second Full EAP Year (Group 3: Full 24 months in EAP) | 137 | 644.96 | 598.20 |
| Qualified but never Entered (Group 2) | 258 | 419.88 | 634.30 |

very strong cyclical component. Arrearage rises during the winter months, then peaks and levels off in the spring. Arrearage drops from spring through fall to the commencement of the service termination moratorium.

As shown in Table VIII-1, some of the groups have rather high arrearages. Note that the "Stable Full Year Participation in EAP" portion of Group 1 has an arrearage at the end of the Participation Year (March 1995) about equal to that of the set of payment-troubled low-income customers who opted for the traditional approach to collections (Group 2, last row of the table). The part of Group 1 that does not succeed in remaining in EAP for the full Participation Year has a high arrearage amount ($2008.93), in contrast to the part of Group 1 which succeeds in EAP ($613.61). The entry in the first row of the table is, of course, the average of these two parts of Group 1. The next to the bottom row of the table contains Group 3, which has completed a full second year of EAP participation. Arrearage for this group is high, but Group 3 is made up of early participants in EAP, and their Baseline arrearage amounts are also high. In contrast to arrearage amount, change in arrearage shows a more consistent pattern.

The entries in Table VIII-2, columns 3 & 4 are changes in arrearage in one year (total arrearage is not shown). Column 5 shows the difference between the two years. Negative numbers in columns 3 and 4 are decreases in total arrearage within a year. In column 5, improvements in arrearage reduction from the baseline to the participation year are shown by positive numbers, and increases in arrearage are shown by negative numbers. The negative entry for the fifth row (29.11) represents a positive balance although the second full participation year for this group shows a smaller positive balance than the first participation year.

**Table VIII-2: Change in Arrearage**

| CHANGE IN ARREARAGE PER CUSTOMER | | | | |
|---|---|---|---|---|
| Column 1 | Col. 2 | Col. 3 | Col. 4 | Col. 5 |
| | n | Baseline | Participation Year | Improvement |
| All New EAP Customers (Group 1) | 221 | 182.08 | 118.47 | 63.61 |
| At least some Participation (Group 1: less than 12 months EAP) | 68 | 314.76 | 504.02 | (189.26) |
| Stable Year's Participation (Group 1: 12 months EAP post) | 153 | 123.10 | (52.90) | 175.99 |
| Stable Second full EAP Year (Group 3: 12 months EAP post) | 283 | (19.81) | (46.78) | 26.97 |
| Stable Second full EAP Year (Group 3: 24 months EAP) | 137 | (96.28) | (67.17) | (29.11) |
| Qualified but never Entered (Group 2) | 258 | 21.43 | (53.06) | 74.49 |

With the exception of those customers unable to maintain full EAP participation (Table VIII-2, row 2), all other groups show improvement in arrearage reduction (rows 1, 3, 4, and 6) or positive balance (row 5).

The result is that EAP participants who are able to be successful in remaining in the program are achieving a reduction in arrearage, although the yearly reduction is small in amount. Overall, the annual reduction in

arrearage by EAP participants is similar to that of customers in the traditional approaches to collections.

## B. Major Recommendation: Arrearage

The finding in this section of the study is that for stable EAP participants, arrearage reduction is occurring, but the effect is small. For those with relatively high arrearage, this means that EAP participation essentially stabilizes the customer with respect to arrearage, and contributes in a small way to reduction.

Arrearage reduction is a worthwhile goal in restoring the business relationship between the utility and the payment troubled customer. But, given the finding of stabilization, if arrearage is to be reduced Equitable should investigate the economics of direct arrearage forgiveness for customers who meet current bill (at the EAP rate) for a certain period of time, perhaps one year.

Section
9

# IX. Continuation of Services at Reasonable Cost (Cost/Benefit)

## A. EAP as a Rational Approach to Minimizing already existing Costs

The basic perspective for analysis of the funding of CAP-type projects begins from recognition of the reality that utilities and their customers necessarily bear costs attributable to low-income payment-troubled customers. The alternative pricing, and the associated bundle of conditions and requirements that must be met by EAP customers is intended as a rational business approach for dealing with this inherent cost. EAP is intended to bring maximum value to the participating customer while minimizing cost to Equitable, and benefiting all other customers. This general perspective of trying to establish a rational solution to a situation which has been chaotic, costly, and previously intractable has been aptly summarized by the Bureau of Consumer Services (BCS) in a report to the Pennsylvania Public Utility Commission:

> In regard to costs, it may appear that implementing these recommendations will result in significant cost increases to all ratepayers. The Bureau's position is that ratepayers are already bearing significant costs attributable to the problems of payment troubled customers and uncollectible balances. Incorporating the following recommendations into utility operations will lead to a more rational and cost effective use of existing resources, and over time possibly reduce total utility costs. The one exception to this perspective may be the costs associated with the implementation of CAPs. The BCS believes that each CAP must be carefully implemented and evaluated if the CAPs are to become revenue neutral. However, even if CAPs prove not to be revenue neutral, the Bureau believes they still must be implemented since they are currently the most

> rational approach to addressing health and safety concerns associated with home energy services for payment troubled, low income households.[68]

Equitable's Policy Statement similarly cites the inherent problem of meeting the needs of low-income payment-troubled customers, including the failure of existing payment options, assistance, and budget counseling to stabilize the behavior and costs of this significant market segment:[69]

> Equitable Gas Company, as well as many other Pennsylvania utilities, has experienced ongoing difficulties associated with payment-troubled customers. Notwithstanding the payment plans developed and benefits offered under various programs, including Federal grant assistance, budget counseling and other funding efforts undertaken by the Company, these customers continue to fall behind in amounts owed for their natural gas service. During 1989, the Company analyzed the accounts of approximately 8,700 payment-troubled customers with household incomes at or below 150% of the Federal poverty guidelines. A comparison of the payment agreements negotiated with the Company (or directed by BCS) with the payments made, shows that these customers were paying, on average, approximately 50% of the monthly payment plan amount.
>
> Equitable realized that a different approach was needed to (1) remove these customers from the discouraging, ineffective and expensive collection cycle; (2) motivate them to increase conservation; (3) increase their annual participation in available funding assistance programs and (4) encourage consistent bill-payment.... On November 21, 1990, the pilot EAP was approved by the Commission and was subsequently implemented.

Previous sections of this study have established that a significant sector of low-income payment-troubled customers respond favorably to the EAP

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[68] Executive Summary of Recommendations, *Investigation of Uncollectible Balances*, Report to the Pennsylvania Public Utility Commission, August 1991, Pp. 7-8.

[69] Response of Equitable Gas Company to Ordering Paragraph No. 11 and Motion of Chairman David W. Rolka as Contained in Order Entered in Docket No. R-912164 on July 16, 1992, September 14, 1992, P. 7.

offer so that of those who entered the pilot EAP, about 70% fully met the EAP requirements in the participation year, and the success rate for two full years is 68%.[70] Analysis has also demonstrated that those who are successful in EAP pay in full the variable cost of gas plus a contribution to fixed cost.[71] EAP has been very successful in restoring the pattern of regular payment.[72] Also, analysis has demonstrated that EAP helps participants bring in more grant funds,[73] that the administrative cost of EAP (by the top down approach) is less than the administrative cost of traditional approaches to collections for payment-troubled low-income customers,[74] that there is no tendency on the part of participants to abuse the program by increasing energy use,[75] and that EAP helps customers contribute to a reduction in their arrearage amount (although the size of the reduction is small)[76].

It remains, in this section of the report, to put the various pieces of cost and benefit together to assess overall program performance and to examine how close EAP comes to revenue neutrality.

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[70] And, a bit better (71%) if re-enrollment is included. See Table IV-1, *Succeeding in EAP (%who Stay 1 and 2 Years)*, P. 39.

[71] Table IV-4, *Covering the Variable Cost of Gas*, P. 45.

[72] Table IV-5, *Is Payment Frequency Reliable?*, P. 46.

[73] Table V-1, *Grants Applied*, P. 50.

[74] The first year adds cost, the second compensates for most of the first cost, and beginning with the third year of participation and thereafter there is a net reduction in administrative cost averaged over all years for those who remain in the EAP program. See P. 96.

[75] Table VI-6, *Net Change in Energy Use*, P. 76.

[76] See P. 98.

## B. Assessing Overall Program Performance

By definition, overall program performance involves the relationship of the relative benefits and costs of the program. Once the individual benefits and costs are determined and summed, they are cast into the form of an overall benefit-cost ratio. The primary measure of performance is the "Net Back Ratio" as defined below. A second measure is dollars returned to Equitable.

### 1. Costs

For both performance measures, the incremental costs of EAP consist principally of the program specific overheads as discussed and itemized in Section VII of this study.[77] Another cost is introduced here as a "placeholder" for the less quantifiable costs of customer relations. This placeholder cost is assumed to be $50.00/year. It is small relative to the other values used in the analysis and does not affect the nature of the outcome of the analysis. It functions to indicate that there is a cost to be attributed to erratic customer behavior, to the situation of customers who may have no option but to juggle payments, to the consequent appearance of customer gaming of the payment system, and to litigious consequences that may be engendered by a few dramatized health hazard situations which may have been avoidable. Specifically, this is the cost to the Company of erratic payment, associated with the development of a psychosocial syndrome of alienation, complaint, and despair in contrast to a functioning customer relationship with mutual respect and regular payments.[78] This relationship adjustment is applied to the "Net Back Ratio as an additional cost, but it is left out of the dollar return

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[77] Table VII-1, *Cost Categories Included in Top-Down Approach*, P. 92.

[78] This is a conservative monetization of relationship cost. It is an indicator cost for relationship problems.
*(footnote continued)*

calculation because it is a cost concept that is not actually monetized in utility accounting.

### 2. Benefits

In introducing a discussion of program benefits, it should be noted that it has been shown that the program meets the economic criterion for benefit to the *non-participant* customers.[79] Also, as discussed earlier, EAP meets the *societal* expectations of (a) provision of energy services to those customers whose incomes are too small to support standard pricing of gas, and of (b) requiring payment for service.[80] Additionally, the program benefits stable *participant* customers (a) by providing access to energy services at an affordable rate and (b) by instituting the requirement of regular payment.

With benefits to other parties shown earlier, in this section the focus is on benefit to the *utility*. From a utility perspective, the benefits of EAP go beyond the purely monetary, but for purposes of analysis the principal benefits considered here are the realized program payments, both customer payments to the Company and receipt of grants by the Company.

### 3. The Measures: "Net Back Ratio" and "Dollars Returned"

The "Net Back Ratio" is a comprehensive measure of program performance referenced to the variable cost of gas. It provides an explicit quantitative result which shows whether the variable cost of gas is covered by a payments, and a ranking tool for assessing return beyond

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[79] Participants pay full variable cost plus a contribution to fixed cost. See Section IV.

variable cost. "Dollars Returned" is simply the absolute difference in dollars collected from the different groups. Of the two measures, the "Net Back Ratio" is attuned to the emerging competitive era in which optional rate products will increase in number, and such ratios will provide a general tool for analyzing rate products. The "Dollars Returned" remains relevant for accounting under traditional utility regulation and the emerging competitive era.

a) "Net Back Ratio"

For the analysis, we use a benefit-cost measure of a type suggested by Roger Colton, the "Net Back Ratio" (NBR). The philosophy of this measure was introduced in Colton (1991):[81]

> In addition to the decreased expenses associated with an EAP, a participating utility will experience increased gross revenue as well. Even though the billed amount will decrease, the amount of revenue actually collected will increase. The concept behind this statement is simple: It is better to collect 95 percent of a $70 bill than it is to collect 50% of a $100 bill.

The nature of "net back" was spelled out more fully by Colton & Elwood in 1995:[82]

> ....a soundly reasoned, economically-based program that minimizes utility losses and maximizes customer contributions makes good business sense. Affordable payment programs should be designed to increase the "net back" to utilities (that is, the net revenue collected from customers after collections expenses and other costs are netted out).

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[80] Section IV.

[81] Colton, Roger, "A Cost-based Response to Low-Income Energy Problems," *Public Utilities Fortnightly*, March 1, 1991.

[82] Colton, Roger & Ron Elwood, "Affordable Payment Programs: Can They Be Justified? Paper presented for tutorial session MPM 11. Pittsburgh, Pennsylvania: Affordable Comfort Conference, March 26-31, 1995.

The specific NBR we employ here is the Net Back Ratio referenced to the *variable cost of gas*. The NBR is a dimensionless number which gives the number of dollars netted by the program for every dollar of variable gas expense. Since this measure uses the variable price of gas as a reference base, performance in one period may readily be compared with performance in another period with a different variable cost of gas. The measure assumes the value of one (1) when payments equal the variable cost of gas. Values greater than one (1+) indicate net receipts that exceed the variable cost of gas. Values less than one (1-) indicate net receipts that are less than the variable cost of gas. The NBR explicitly shows the performance of EAP relative to the variable cost of gas which is a primary program performance objective. Note, also, that NBR automatically incorporates the effects of changes in the variable cost of gas between or during the Baseline and Participation Years. As such it serves as a comprehensive performance indicator. For a strictly comparative analysis, this relation may be calculated with the variable cost of gas held constant to gauge comparative effects between the Baseline and Participation Years.

Specifically, the NBR is calculated as follows:

**Net Back Ratio = NBR = (Net Program Receipts)/(Variable Cost of Gas)**

Where:

Net Program Receipts = Payments + Grants - Program Specific Overhead - Other Costs

Variable Cost of Gas = Commodity Cost of Gas + Monthly Delivery Cost

b) "Dollars Returned"

"Dollars Returned" is the dollars per customer returned to Equitable due to the program, that would not have been returned in the absence of the

program. The reference base for dollars returned is the modeled 1989 Reference Group in relation to the standard residential rate.

| COMPARATIVE PERFORMANCE | | | | | | |
|---|---|---|---|---|---|---|
| Col. 1 | Col. 2 | Col. 3 | Col. 4 | Col. 5 | Col. 6 | Col.7 |
| | | | | | Variable | |

**Table IX-1: Comparative Net Back Ratio Results**

| Group | Customer Payments | Grants Applied | Overhead | Other Costs | Cost of Gas | NBR |
|---|---|---|---|---|---|---|
| 1989 Reference[1] | 684 | 0 | 81 | 50 | 607 | 0.91 |
| Baseline Pre-Period[2] | 845 | 153 | 81 | 50 | 495 | 1.75 |
| Baseline Pre-Period (Rate Corrected)[3] | 845 | 153 | 81 | 50 | 607 | 1.43 |
| EAP: Less than one year | 580 | 195 | 126 | 50 | 577 | 1.03 |
| EAP: One full year | 729 | 226 | 97 | 0 | 607 | 1.41 |
| EAP: Two full years | 744 | 239 | 54 | 0 | 680 | 1.37 |
| Tuned EAP[4] | 878 | 226 | 75 | 0 | 607 | 1.69 |
| Standard Rate | 1368 | 0 | 0 | 0 | 607 | 2.25 |

(1) The "1989 Reference" is not the actual 1989/90 study group, but a simulation using a 50% payment of the standard rate.
(2) The "Baseline Pre-Period" group is the actual data for Group 1 (n=221).
(3) The "Baseline Pre-Period (Rate Corrected)" group uses actual data for Group 1 (n=221), but is rate adjusted for purposes of comparison.
(4) The "Tuned EAP" group is the same as the "EAP One Full Year" group (n=153), but with payment adjusted to 10% for the top two poverty classifications.

## 4. Results

Results on the Net Back Ratio and on Dollars Returned are presented separately, and then assessed together.

### a) Net Back Ratio Results

Results on this measure are displayed in Table IX-1. This table includes four virtual groups: a modeled "1989 Reference Group", a rate corrected

(modeled) "Baseline Group", a modeled "Tuned EAP", and a modeled "Standard Rate Group". The performance of these reference programs has been calculated by modifying cost and benefit values to simulate performance under the various reference conditions. Using these reference cases, the performance of the actual EAP-related sub-populations is contrasted.

The most striking fact evident in the table is that all groups except the 1989 Reference Group show a positive return (NBR) with respect to the variable cost of gas. The 1989 Reference Group, simulating the behavior of pre-program payment troubled customers (row 1) has a NBR of 0.91, the lowest NBR in the table. The highest NBR is given by the Standard Rate (row 7) which evidences a NBR of 2.25. These two values bracket the readings of the other groups.

Those who fully participate in one year of EAP (row 5) show a NBR of 1.41. Those with two full years of EAP (row 6) show essentially the same performance, with a NBR of 1.37. Both of these results are quite favorable compared to the 1989 Reference Group with its NBR of 0.91.

The two EAP groups, with NBR values of 1.41 and 1.37 have essentially the same performance as the Baseline Pre-Period group with rate correction (1.43; row 3). When rounded, these three groups each show a value of 1.4 for the NBR.

Those who drop out of EAP in their first year (row 4) show the poorest EAP performance with a Net Back Ratio of 1.03. This group had an average of six missed payments in a year, but even so, their sum of payments plus grants just covered the variable cost of gas. A "Tuned EAP" group (row 7) models the NBR with a slightly higher payment ceiling (10% vs. 8%) for the portion of EAP participants with an income in the

range of 51%-150% of poverty. This change improves the NBR from 1.41 in the actual first year EAP to 1.69 in the Tuned EAP case, and shows that with a small change EAP could reasonably be expected to perform at a higher revenue level.

b) Dollars Returned Results

The "Dollars Returned" measure is referenced to the payment behavior evidenced by the 1989 Reference Group. In this model, based on the 50% payment rate in the group studied in 1989-1990, a customer who would have been billed $1368 at the standard residential rate would have created a shortfall of $684 from the standard residential rate, not including the increased cost of collection (Table IX-2, row 6). At the other extreme, if a customer paid each bill on time under the standard rate, the shortfall would be $0 (Table IX-2, row 7). These values bracket the performance of the different groups.

It is interesting that the use of the term "shortfall" becomes ambiguous as utilities move toward a situation of increasing competition, and to increasingly offer a spectrum of rate products within the different customer classes. This is because with a proliferation of rate products, the concept of a traditional cost-based standard rate, while historically valid, becomes difficult to maintain.

It is important to recognize that EAP Credits are not the same thing as shortfall. In fact, as shown in Section IV, those successful in EAP evidence a shortfall of zero when shortfall is measured as the difference between price billed at the EAP rate and payments received from EAP customers.[83] In other words, stable EAP customers pay 100% of the

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[83] Table IV-3, *Percentage of Year's Billed Amount Paid*, P. 43 confirms that customers retained in EAP pay at least 100% of their billed amount.

billed amount regularly, since EAP as a rate product requires both full and regular payment, while providing a more workable payment amount for those who cannot pay at the standard residential rate. Here, the EAP Credit is not a shortfall, but a dollar equivalent to the difference between the amount that would have been billed at the standard residential rate and the amount billed at the EAP rate.

If we specifically reference shortfall to billing under the standard residential rate, then shortfall is calculated on an average per customer basis as:

**Shortfall at Standard Rate = Bill at Standard Rate - Payments Received**

Where:

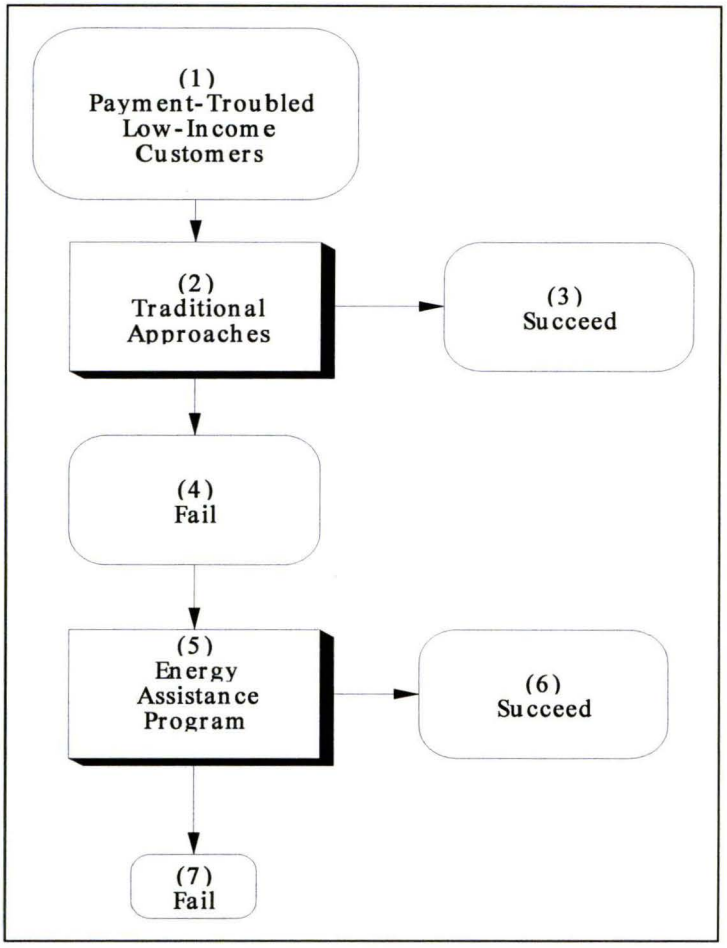
Payments Received = Customer Payments + Grants Applied

As discussed in Sections II & III of the report, EAP was designed to serve payment-troubled low-income customers for whom the traditional approach to collections failed.[84] These customers are shown in box 4 of Figure IX.1. EAP is thus evaluated as a companion to traditional approaches to collection, which are preferred for those customers for whom they can be successful (box 3).

[84] The traditional approach provides equal payment plans and payment agreements under the standard price offer (see Section II.F).

Table IX-2: Comparative Revenue Results

Figure IX-1: The Energy Assistance Program




EAP's target customers are those who were in box 4 in the 1989 study, and EAP is designed to intercept and recruit these customers so that they participate in EAP as an alternative to ending up in box 4. As noted above, in 1989 there were 8,700 customers who fell through the traditional collection approaches for payment-troubled low-income customers (Figure IX.1, box 4). On average, these customers paid about 50% of their billed amounts, and it was to intercept this group of customers that EAP was designed.

| COMPARATIVE SHORTFALL PERFORMANCE | | | | | |
|---|---|---|---|---|---|
| Col. 1 | | Col. 2 | Col. 3 | Col. 4 | Col. 6 |

| Group | Standard Rate | Customer Payments +Grants | Shortfall | EAP Credits | Dollars Recovered |
|---|---|---|---|---|---|
| 1989 Reference | 1368 | 684 | 684 | 0 | 0 |
| EAP: One full year | 1385 | 955 | 0 | 430 | 262 |
| EAP: Two full years | 1553 | 983 | 0 | 570 | 206 |
| Tuned EAP | 1368 | 1104 | 0 | 264 | 420 |
| Standard Rate | 1368 | 1368 | 0 | 0 | 0 |

As shown in Table IX-2, although EAP credits are accounted to make up the difference between customer payments plus grants and the standard residential rate, EAP succeeds in recovering (in the sum of customer payments plus grants) dollars which would otherwise not have been received by the utility. For those in EAP for one full year, this amount is $262 (row 2). For those who remain in EAP for a second year there is an additional $206 (row 3). These add to a total of $468 for each customer who is retained in the program for two full years.

If payment is increased by raising the percentage of income to 10% for those in 51% - 150% of poverty, the additional dollars recovered per customer beyond the reference situation of 50% payment from the 1989-90 study, would be approximately $420 per year (row 4).

c) Overall Results of Analysis

Does EAP work as designed? As shown in Table IX-1, *EAP is working perfectly in accord with its design, or at least as perfectly as can be desired in actual practice.* The NBR for the modeled 1989 Reference Group is 0.91, while the NBR for the "EAP: One Full Year" is 1.41, and for "EAP: Two Full Years" is 1.37. *This means that EAP is not only revenue neutral, but revenue positive in relation to the comparison situation for which it was designed.* For those who remain in the program for one year

the amount of additional revenue collected is $262 per customer, and in the second year an additional $206 per customer (Table IX-2).

### 5. Measurement Issue: Baseline Year

In many evaluations, there is a direct comparison of "before" and "after", the "pre" and the "post" which in this evaluation finds expression as the Baseline Year and the Participation Year. For the NBR, we could have performed the following comparison, and reached the following conclusion:

> In comparison to the "Baseline Pre-Period (Rate Corrected)" group which has a NBR of 1.43, the one-year EAP NBR is 1.41, and the two-year EAP NBR is 1.37. For practical purposes these are the same value (1.4) so according to the NBR, EAP is *at least* neutral in a benefit-cost sense in comparison to the future EAP customers in the Baseline Year, before they enter EAP.

The comparison follows from a standard evaluation model, and the result follows from the data. However, there is an important reason not to rely on what might appear a proper comparison. A qualitative difference between the Baseline Year group and the EAP groups interferes with a straightforward comparison and interpretation. The source of this difference is in the change in group membership over time which is occasioned by the earlier introduction of EAP to solve the 50% payment problem documented using 1989-90 data on payment-troubled customers.

In brief, the nature of the comparison group (the Baseline Year group) is changed by EAP so that it cannot be used for valid comparisons. Consider that the two EAP groups are stabilized with a NBR of 1.4. Given the stability shown for first and second year full-year participants, the NBR of 1.4 may reasonably be projected into the future, absent changes to the structure of the program. So long as customers are retained in the EAP

program, their payment behavior is necessarily both stable and regular, since these features are program requirements. But, in contrast to the stable behavior of the EAP groups, the "Baseline Pre-Period (Rate Corrected)" group (a) has already been transformed in a positive direction by the existence of EAP, and (b) is not stabilized, but is in motion.

The make-up of the "Baseline Pre-Period (Rate Corrected)" group consists of a higher proportion of customers with less severe payment problems because (a) the pre-existing pool of most severe cases typical of those evident in the 1989-90 study have already been recruited into EAP in EAP's first years, and new cases which would have shown this typical 50% payment result are now recruited into EAP as they begin to experience payment difficulties.

The number of slots budgeted for EAP is close to the size of the payment-troubled pool developed in the 1989-90 study. So, once an option such as EAP has been in existence for a few years, alongside traditional approaches to credit and collection for payment-troubled customers, a simple comparison to a Baseline Year is biased toward underestimation of EAP performance. *The more effective in recruiting the payment-troubled customer pool in past years, and the more effective in preventing severe payment problems by offering a workable alternative, the less effective EAP would appear in such a comparison.*

This same dynamic is operative in the analysis of shortfall (Table IX-2). The shortfall for the "Baseline Pre-Period" group is only $320, while the EAP Credit for the one-year EAP group is $430, and the EAP Credit for the two-year EAP group is $570. Here, only the "Tuned EAP" group, with EAP Credit in the amount of $264 shows a revenue positive result in a direct comparison. But a direct comparison understates the performance of EAP because EAP's success lowers the shortfall in Baseline Year.

*Ironically, the better EAP works, the less well it will appear in such a comparison.* The correct comparison is to the modeled 1989 Reference Group, operationalized here as 50% payment under the standard residential rate.

EAP customers are, of course, paying 100% of the amount billed under EAP pricing, and restoring their habit of regular payment. For these customers, the arrearage problem (arrearages are not shown in the current billing tables above) has also been turned around, and arrearage is also declining, although by very small amounts each year.[85] Still, to have turned the problem around for a majority of payment-troubled low-income customers is a major accomplishment.[86]

A more rigorous estimate would distinguish between arrearages and EAP credits. These may have the same magnitude, but a differing rate treatment because of differing lag days and potentially different tax treatment.

### C. Revenue Impact of Those who Fail

What happens to the 30% of customers who enter EAP, but fail to fully comply with program requirements during the first year? Those who drop out of EAP return to the traditional collection approaches, or may reapply to EAP after meeting certain conditions. But, by and large, those who totally disappear from EAP either leave the system or fall into the pattern of approximately 50% payment, paid erratically, under the standard residential pricing offer. Any additional costs caused by attempts to recruit these customers into EAP are marginal in relation to this basic problem.

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[85] See Section VIII for this result.

## D. Distributional Effect by Income Level

The revenue effect by poverty level is shown in Table IX-3. Here, the percentage EAP credit is approximately equally across the three

| DISTRIBUTIONAL EFFECTS | | | | | | |
|---|---|---|---|---|---|---|
| Col. 1 | Col. 2 | Col. 3 | Col. 4 | Col. 5 | Col. 6 | Col. 7 |
| Group | n | Standard Rate | Customer Payment | Grants Applied | EAP Credit | % EAP Credit |
| 0 - 50% Poverty | | | | | | |
| All New EAP | 49 | 1240 | 567 | 323 | 350 | 28% |
| EAP-12 | 31 | 1275 | 619 | 360 | 296 | 23% |
| EAP-24 | 30 | 1449 | 624 | 322 | 503 | 35% |
| 51 - 100% Poverty | | | | | | |
| All New EAP | 100 | 1372 | 660 | 220 | 492 | 36% |
| EAP-12 | 69 | 1335 | 713 | 235 | 387 | 29% |
| EAP-24 | 66 | 1597 | 704 | 257 | 636 | 40% |
| 101 - 150% Poverty | | | | | | |
| All New EAP | 72 | 1449 | 796 | 141 | 512 | 35% |
| EAP-12 | 53 | 1514 | 815 | 137 | 562 | 37% |
| EAP-24 | 41 | 1561 | 896 | 149 | 516 | 33% |
| Note: EAP Credits column may include small write-offs on the order of $20-$30. | | | | | | |

**Table IX-3: Distributional Effects**

income groups. This is a function of the grants which are applied to the lowest income customers within the poverty groups as funds become scarce and rationing is applied.

## E. Major Recommendation: Increase Payment Percentage

This section has demonstrated that EAP is working – perfectly – in accord with its design. However, based on payments made prior to EAP, and retention data (Table IV-2, Poverty, page 42) there is basis for the expectation that some participants could pay a somewhat higher rate in

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[86] As shown in Section IV, these findings apply to the 70% of participants who *(footnote continued)*

EAP. Equitable should consider altering the EAP design to include a sliding payment scale. Specifically, the payment for both the 51%-100% poverty and the 101-150% poverty range might be raised to 10%. As a test, the change could be monitored through ongoing reporting of retention by poverty group. If retention for this group does not drop, the sliding scale should be adopted as an ongoing part of the program.

The effect of such an increase is shown in the graph labeled Figure IX-2 which shows the distribution of payments, in ascending order for 221 EAP participants. In this graph the top line represents payment at the standard residential rate. The bottom line is the variable cost of gas. The lines between the top and bottom show the distribution of payments at different requirements for percent of income payment. The higher line represents the proposed change to 10% for customers in the 51% - 150% of poverty ranges, and the lower represents the current payment arrangement (8% for all three poverty groups). In the graph, the vertical axis represents annual dollars to be paid, and the horizontal axis represents individual cases which are sorted in order of consumption.

The proposed higher payment line in Figure IX-2 was generated by increasing payment for two poverty levels (51% - 100% and 101% - 150%) while the bottom poverty level (0-50%) is left at the current payment level. Also, for the two poverty level groups for which payment was increased from 8% to 10%, the payment was kept at 8% for every customer for whom an increase to 10% would have exceeded the last known budget amount.

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are successful in EAP for one year, and the 68% successful for two years.

**Figure IX-2: Alternative Payment Scale**

Section

# 10

## X. A Final Note

As this study has demonstrated, Equitable's Energy Assistance Program (EAP) is successful. It works as planned. More importantly, it benefits participant customers, non-participant customers, Equitable, and society. The practical questions examined by the study, and the results obtained are provided in the Executive Summary (Section I), along with a list of the recommendations.

This evaluation has taken some paths which appear promising, and can be further developed by evaluators in future evaluations. These include a 'top-down' approach to cost of traditional programs, a process outlook for the impact evaluation which moves a step or two beyond the use of the traditional (quasi-experimental) design, using power analysis in the key statistical comparisons, a pooled data approach to the energy consumption analysis, and a restatement of the usual evaluation format into a set of practical questions. Finally, we have implemented Colton's "Net-Back" approach to the benefit-cost relationship.

These pathways for greater fidelity to the nature of the program and the data are emerging in work in Pennsylvania because of its strong and multi-year experiment in making low-income and CAP-type programs workable and effective. That sustained effort has created a working climate favorable to getting the programs to work effectively, and to improving the measurement and analysis of results.

How solid are the results in this study? Very. For example, the finding of no abuse of the program (Section VI) is based on the agreement of three approaches, the individual case method, a pooled data analysis, and agreement with management reporting data for the population. But, in addition, the full analysis of the study is supported by a second set of data developed with a different six-month entry window. The study was repeated with the same results.[87]

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[87] The second analysis is reported at a few points where it is of use in clarification. The profiles of the Original Study Set and Second Study Set are included in the appendix (Section XI).

Section

11

# XI. Appendix: Customer Group Profiles

This appendix contains two sets of profiles of customer groups. The profiles labeled "original data set" are for the groups used throughout the study. Those labeled "data set #2" are parallel groups from a second analysis, defined exactly like the first but with a different entry window.[88]

[88] The data restrictions are those used generally throughout the study, not including the special restrictions used in the analysis of energy consumption.

**Table XI-1: Profiles of the Study Groups**

| NEW EAP (GROUP 1) ORIGINAL STUDY SET | All cases | Seniors (60+) | Non-seniors | 12 months EAP post period | Less than 12 months EAP post period |
|---|---|---|---|---|---|
| Total number of cases | 221 | 73 | 148 | 153 | 68 |
| Number of seniors | 73 | 73 | 0 | 66 | 7 |
| Poverty level 0-50% | 49 | 1 | 48 | 31 | 18 |
| Poverty level 51-100% | 100 | 29 | 74 | 70 | 31 |
| Poverty level 101-150% | 72 | 43 | 29 | 52 | 19 |
| Number earning income All sources | 221 | 73 | 148 | 153 | 68 |
| Mean monthly income All sources | $668 | $681 | $662 | $639 | $735 |
| Number earning wages | 68 | 11 | 57 | 42 | 26 |
| Mean monthly wages | $656 | $416 | $702 | $596 | $753 |
| Number receiving DPA income | 61 | 1 | 60 | 37 | 24 |
| Mean monthly DPA | $345 | $403 | $344 | $338 | $356 |
| Number receiving social security income | 82 | 63 | 19 | 73 | 9 |
| Mean monthly Soc. sec. income | $560 | $596 | $440 | $571 | $468 |
| Number receiving other income | 89 | 26 | 63 | 60 | 29 |
| Mean monthly other income | $301 | $258 | $319 | $279 | $348 |
| Number receiving unemployment | 16 | 1 | 15 | 4 | 12 |
| Mean monthly unemployment | $580 | $425 | $590 | $431 | $629 |

| ORIGINAL STUDY SET | All cases (N=221) | | Seniors (60+) (n=73) | | Non-seniors (n=148) | | 12 months EAP post period (n=153) | | Less than 12 months EAP post period (n=68) | |
|---|---|---|---|---|---|---|---|---|---|---|
| NEW EAP (GROUP 1) | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount |
| LIHEAP pre | 117 | $185 | 42 | $169 | 75 | $194 | 89 | $183 | 28 | $190 |
| LIHEAP post | 147 | $175 | 45 | $157 | 102 | $182 | 113 | $174 | 34 | $176 |
| CRISIS pre | 33 | $284 | 3 | $274 | 30 | $285 | 16 | $289 | 17 | $280 |
| CRISIS post | 52 | $277 | 8 | $246 | 44 | $283 | 34 | $270 | 18 | $292 |
| OTHER pre | 14 | $204 | 3 | $233 | 11 | $195 | 11 | $195 | 3 | $233 |
| OTHER post | 33 | $236 | 8 | $269 | 25 | $226 | 24 | $240 | 9 | $226 |
| Total Grants pre | 128 | $265 | 43 | $201 | 85 | $297 | 95 | $243 | 33 | $327 |
| Total Grants post | 168 | $285 | 50 | $224 | 118 | $311 | 124 | $279 | 44 | $301 |

| ORIGINAL STUDY SET NON-PARTICIPANTS (GROUP 2) | All cases | Seniors (60+) | Non-seniors | EAP qualify | Do not EAP qualify |
|---|---|---|---|---|---|
| Total number of cases | 298 | 51 | 247 | 258 | 40 |
| Number of seniors | 51 | 51 | 0 | 46 | 5 |
| Poverty level 0-50% | 47 | 0 | 47 | 46 | 1 |
| Poverty level 51-100% | 141 | 29 | 112 | 129 | 12 |
| Poverty level 101-150% | 110 | 22 | 88 | 83 | 27 |
| Number earning income All sources | 298 | 51 | 247 | 258 | 40 |
| Mean monthly income All sources | $834 | $759 | $850 | $774 | $1,225 |
| Number earning wages | 188 | 20 | 168 | 157 | 31 |
| Mean monthly wages | $817 | $635 | $838 | $763 | $1,090 |
| Number receiving DPA income | 26 | 1 | 25 | 25 | 1 |
| Mean monthly DPA | $391 | $977 | $367 | $394 | $318 |
| Number receiving social security income | 45 | 29 | 16 | 42 | 16 |
| Mean monthly Soc. sec. income | $518 | $515 | $525 | $505 | $693 |
| Number receiving other income | 112 | 20 | 92 | 96 | 3 |
| Mean monthly other income | $495 | $441 | $507 | $462 | $707 |
| Number receiving unemployment | 9 | 1 | 8 | 7 | 2 |
| Mean monthly unemployment | $675 | $1288 | $598 | $627 | $844 |

| ORIGINAL STUDY SET | All cases (N=298) | | Seniors (60+) (n=51) | | Non-seniors (n=247) | | EAP qualify (n=258) | | Do not EAP qualify (n=40) | |
|---|---|---|---|---|---|---|---|---|---|---|
| NON-PARTICIPANTS (GROUP 2) | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount |
| LIHEAP pre | 70 | $168 | 15 | $167 | 55 | $168 | 68 | $167 | 2 | $186 |
| LIHEAP post | 77 | $186 | 13 | $185 | 64 | $186 | 73 | $185 | 4 | $207 |
| CRISIS pre | 28 | $272 | 2 | $279 | 26 | $271 | 28 | $272 | 0 | $0 |
| CRISIS post | 31 | $272 | 6 | $284 | 25 | $269 | 30 | $273 | 1 | $250 |
| OTHER pre | 9 | $177 | 1 | $200 | 8 | $175 | 9 | $177 | 0 | $0 |
| OTHER post | 12 | $226 | 3 | $267 | 9 | $212 | 11 | $232 | 1 | $160 |
| Total Grants pre | 74 | $283 | 15 | $217 | 59 | $299 | 72 | $286 | 2 | $186 |
| Total Grants post | 91 | $280 | 18 | $273 | 73 | $282 | 85 | $285 | 6 | $206 |

| ORIGINAL STUDY SET ONGOING EAP (GROUP 3) | All cases | Seniors (60+) | Non-seniors | 12 months EAP post period | Less than 12 months EAP post period |
|---|---|---|---|---|---|
| Total number of cases | 308 | 114 | 194 | 283 | 25 |
| Number of seniors | 114 | 114 | 0 | 114 | 0 |
| Poverty level 0-50% | 67 | 5 | 62 | 60 | 7 |
| Poverty level 51-100% | 151 | 62 | 89 | 137 | 14 |
| Poverty level 101-150% | 90 | 47 | 43 | 86 | 4 |
| Number earning income All sources | 308 | 114 | 194 | 283 | 25 |
| Mean monthly income All sources | $646 | $633 | $654 | $642 | $702 |
| Number earning wages | 81 | 16 | 65 | 65 | 16 |
| Mean monthly wages | $628 | $436 | $676 | $606 | $720 |
| Number receiving DPA income | 71 | 3 | 68 | 65 | 6 |
| Mean monthly DPA | $325 | $302 | $326 | $321 | $372 |
| Number receiving social security income | 141 | 95 | 46 | 137 | 4 |
| Mean monthly Soc. sec. income | $518 | $537 | $481 | $519 | $481 |
| Number receiving other income | 123 | 47 | 76 | 118 | 5 |
| Mean monthly other income | $378 | $272 | $444 | $382 | $285 |
| Number receiving unemployment | 9 | 1 | 8 | 8 | 1 |
| Mean monthly unemployment | $615 | $592 | $618 | $635 | $459 |

| ORIGINAL STUDY SET | All cases (n=308) | | Seniors (60+) (n=114) | | Non-seniors (n=194) | | 12 months EAP post period (n=283) | | Less than 12 months EAP post period (n=25) | |
|---|---|---|---|---|---|---|---|---|---|---|
| ONGOING EAP GROUP 3 | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount |
| LIHEAP pre | 252 | $174 | 96 | $154 | 156 | $187 | 231 | $174 | 21 | $179 |
| LIHEAP post | 246 | $180 | 93 | $167 | 153 | $187 | 229 | $180 | 17 | $181 |
| CRISIS pre | 100 | $289 | 29 | $292 | 71 | $288 | 90 | $290 | 10 | $278 |
| CRISIS post | 71 | $281 | 16 | $303 | 55 | $275 | 64 | $285 | 7 | $246 |
| OTHER pre | 57 | $273 | 16 | $281 | 41 | $270 | 49 | $272 | 8 | $275 |
| OTHER post | 37 | $247 | 10 | $240 | 27 | $250 | 32 | $253 | 5 | $210 |
| Total Grants pre | 260 | $340 | 98 | $283 | 162 | $374 | 239 | $333 | 21 | $416 |
| Total Grants post | 252 | $291 | 93 | $245 | 159 | $318 | 235 | $287 | 17 | $344 |

**Table XI-2: Profiles of the Second Study Set Groups**

| SECOND STUDY SET NEW EAP, GROUP 1 | All cases | Seniors (60+) | Non-seniors | 12 months EAP post period | Less than 12 months EAP post period |
|---|---|---|---|---|---|
| Total number of cases | 114 | 32 | 82 | 80 | 34 |
| Number of seniors | 32 | 32 | 0 | 30 | 2 |
| Poverty level 0-50% | 25 | 1 | 24 | 16 | 9 |
| Poverty level 51-100% | 44 | 11 | 33 | 29 | 15 |
| Poverty level 101-150% | 45 | 20 | 25 | 35 | 10 |
| Number earning income All sources | 114 | 32 | 82 | 80 | 34 |
| Mean monthly income All sources | $761 | $751 | $765 | $736 | $820 |
| Number earning wages | 28 | 2 | 26 | 18 | 10 |
| Mean monthly wages | $823 | $664 | $835 | $799 | $866 |
| Number receiving DPA income | 30 | 0 | 30 | 18 | 12 |
| Mean monthly DPA | $359 | 0 | $359 | $342 | $385 |
| Number receiving social security income | 47 | 28 | 19 | 42 | 5 |
| Mean monthly Soc. sec. income | $555 | $586 | $510 | $564 | $485 |
| Number receiving other income | 55 | 20 | 35 | 38 | 17 |
| Mean monthly other income | $379 | $289 | $430 | $333 | $481 |
| Number receiving unemployment | 8 | 1 | 7 | 5 | 3 |
| Mean monthly unemployment | $748 | $503 | $783 | $796 | $666 |

| SECOND STUDY SET NON-PARTICIPANTS (GROUP 2) | All cases | Seniors (60+) | Non-seniors | EAP qualify | Do not EAP qualify |
|---|---|---|---|---|---|
| Total number of cases | 119 | 18 | 101 | 83 | 36 |
| Number of seniors | 18 | 18 | 0 | 14 | 4 |
| Poverty level 0-50% | 17 | 0 | 17 | 17 | 0 |
| Poverty level 51-100% | 42 | 8 | 34 | 37 | 5 |
| Poverty level 101-150% | 60 | 10 | 50 | 29 | 31 |
| Number earning income All sources | 117 | 18 | 99 | 81 | 36 |
| Mean monthly income All sources | $1,013 | $902 | $1,034 | $779 | $1,539 |
| Number earning wages | 71 | 6 | 65 | 42 | 29 |
| Mean monthly wages | $988 | $870 | $999 | $774 | $1,297 |
| Number receiving DPA income | 15 | 1 | 14 | 14 | 1 |
| Mean monthly DPA | $351 | $403 | $348 | $348 | $402 |
| Number receiving social security income | 16 | 11 | 5 | 14 | 2 |
| Mean monthly Soc. sec. income | $648 | $643 | $660 | $636 | $738 |
| Number receiving other income | 48 | 10 | 38 | 31 | 17 |
| Mean monthly other income | $535 | $354 | $583 | $480 | $637 |
| Number receiving unemployment | 8 | 0 | 8 | 4 | 4 |
| Mean monthly unemployment | $877 | 0 | $877 | $484 | $1,270 |

| SECOND STUDY SET ONGOING EAP (GROUP 3) | All cases | Seniors (60+) | Non-seniors | 12 months EAP post period | Less than 12 months EAP post period |
|---|---|---|---|---|---|
| Total number of cases | 120 | 51 | 69 | 111 | 9 |
| Number of seniors | 51 | 51 | 0 | 50 | 1 |
| Poverty level 0-50% | 20 | 0 | 20 | 16 | 4 |
| Poverty level 51-100% | 57 | 30 | 27 | 55 | 2 |
| Poverty level 101-150% | 43 | 21 | 22 | 40 | 3 |
| Number earning income All sources | 119 | 51 | 68 | 110 | 9 |
| Mean monthly income All sources | $698 | $651 | $733 | $683 | $882 |
| Number earning wages | 29 | 3 | 26 | 27 | 2 |
| Mean monthly wages | $771 | $195 | $837 | $727 | $1,365 |
| Number receiving DPA income | 20 | 1 | 19 | 17 | 3 |
| Mean monthly DPA | $336 | $202 | $343 | $337 | $329 |
| Number receiving social security income | 67 | 49 | 18 | 65 | 2 |
| Mean monthly Soc. sec. income | $520 | $520 | $520 | $517 | $605 |
| Number receiving other income | 59 | 27 | 32 | 54 | 5 |
| Mean monthly other income | $309 | $258 | $352 | $286 | $557 |
| Number receiving unemployment | 2 | 0 | 2 | 1 | 1 |
| Mean monthly unemployment | $450 | $0 | $450 | $672 | $228 |

| SECOND STUDY SET | All cases | | Seniors (60+) | | Non-seniors | | 12 months EAP post period | | Less than 12 months EAP post period | |
|---|---|---|---|---|---|---|---|---|---|---|
| NEW EAP (GROUP 1) | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount |
| LIHEAP pre | 46 | $142 | 12 | $148 | 34 | $140 | 38 | $143 | 8 | $140 |
| LIHEAP post | 47 | $140 | 9 | $117 | 38 | $145 | 37 | $128 | 10 | $184 |
| CRISIS pre | 10 | $250 | 0 | $0 | 10 | $250 | 6 | $250 | 4 | $250 |
| CRISIS post | 11 | $250 | 1 | $250 | 10 | $250 | 6 | $249 | 5 | $250 |
| OTHER pre | 5 | $320 | 0 | $0 | 5 | $320 | 3 | $267 | 2 | $400 |
| OTHER post | 8 | $202 | 3 | $133 | 5 | $243 | 6 | $171 | 2 | $295 |
| Total Grants pre | 50 | $213 | 12 | $148 | 38 | $233 | 40 | $193 | 10 | $292 |
| Total Grants post | 57 | $192 | 12 | $142 | 45 | $205 | 43 | $169 | 14 | $263 |

| SECOND STUDY SET | All cases | | Seniors (60+) | | Non-seniors | | EAP qualify | | Do not EAP qualify | |
|---|---|---|---|---|---|---|---|---|---|---|
| **NON-PARTICIPANTS (GROUP 2)** | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount |
| LIHEAP pre | 16 | $127 | 6 | $119 | 10 | $132 | 11 | $152 | 5 | $73 |
| LIHEAP post | 14 | $133 | 6 | $112 | 8 | $148 | 12 | $145 | 2 | $60 |
| CRISIS pre | 7 | $250 | 3 | $250 | 4 | $250 | 7 | $250 | 0 | $0 |
| CRISIS post | 1 | $266 | 0 | $0 | 1 | $266 | 1 | $266 | 0 | $0 |
| OTHER pre | 1 | $400 | 1 | $400 | 0 | $0 | 1 | $400 | 0 | $0 |
| OTHER post | 4 | $250 | 2 | $150 | 2 | $350 | 4 | $250 | 0 | $0 |
| Total Grants pre | 20 | $209 | 8 | $233 | 12 | $193 | 15 | $255 | 5 | $73 |
| Total Grants post | 15 | $208 | 6 | $162 | 9 | $239 | 13 | $231 | 2 | $60 |

| SECOND STUDY SET | All cases | | Seniors (60+) | | Non-seniors | | 12 months EAP post period | | Less than 12 months EAP post period | |
|---|---|---|---|---|---|---|---|---|---|---|
| ONGOING EAP (GROUP 3) | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount | Number receiving | Mean annual amount |
| LIHEAP pre | 85 | $186 | 36 | $156 | 49 | $207 | 78 | $186 | 7 | $180 |
| LIHEAP post | 64 | $147 | 29 | $132 | 35 | $159 | 58 | $149 | 6 | $127 |
| CRISIS pre | 22 | $250 | 4 | $250 | 18 | $250 | 19 | $250 | 3 | $250 |
| CRISIS post | 6 | $228 | 1 | $118 | 5 | $250 | 5 | $224 | 1 | $250 |
| OTHER pre | 19 | $244 | 9 | $300 | 10 | $194 | 18 | $241 | 1 | $300 |
| OTHER post | 9 | $208 | 2 | $225 | 7 | $204 | 1 | $208 | 0 | $0 |
| Total Grants pre | 89 | $291 | 37 | $252 | 52 | $319 | 81 | $291 | 8 | $289 |
| Total Grants post | 71 | $178 | 29 | $152 | 42 | $196 | 65 | $179 | 6 | $169 |

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[redacted]

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