Low-Income Energy Efficiency in Ontario:
The Design of a Natural Gas DSM Program

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The Low-Income Energy Network (LIEN) was formed in 2004 to raise awareness of the implications for low-income households of increases in energy prices and to suggest solutions. LIEN aims to ensure universal access to energy as a basic necessity, while minimizing the impact on health and on the local and global environment by meeting the energy and conservation needs of all Ontarians. More than fourteen percent of Ontarians have an income that falls below the Low-Income Cut-off.[1]

The purpose of this evidence is to assist LIEN's intervention in the Ontario Energy Board generic hearing of Demand Side Management Activities for Natural Gas Utilities. This statement addresses three issues presented by the Ontario Energy Board in its Procedural Order No. 2, dated April 28, 2006:

13. Targeted Programs

13.1 Should there be a minimum amount of funds, savings target, or TRC benefits directed toward specific sectors, e.g., low-income, etc.?

13.2 If so, how should eligibility be determined?

13.2 If so, how should target levels be determined?

RECOMMENDATIONS

LIEN recommends that the OEB direct specific funding towards low-income energy efficiency improvements to allow low-income consumers to fully participate in Demand Side Management (DSM) programs of public utilities. LIEN recommends that the following principles guide the DSM programs:

- At a minimum, funding for low-income efficiency improvements should be the amount that is required to make DSM programs fully accessible to low-income residential consumers. Where low income consumers cannot access conservation techniques, the utilities need to spend additional funds to ensure that programs are fully accessible. "Accessibility" is to be determined by whether there are untapped cost-effective measures that can be implemented and whether the institutional capacity exists to deliver those cost-effective measures.

- A full range of DSM services should be delivered, including but not limited to energy audits and air sealing, weatherization, insulation, heating and cooling system replacement with high efficiency equipment, hot water heater replacement, and appliance upgrades.

[1] "Increasing Productivity and Moving Towards a Renewable Future: A New electricity Strategy for Ontario" (Clean Air Alliance October 2005) p. 28 – in 2003 14.3 % of Ontario residents, or 1,733,000 persons were living at or below the "pre-tax, post-transfer low-income cut offs". This statistic is from Statistics Canada.

- Basic income eligibility should be set at 125 percent of the Low-Income Cutoff. A designated proportion of total low-income funding should be set aside for households with incomes marginally exceeding the Low-Income Cutoff.

- Efficiency investments should be targeted not only on the basis of high usage, but also on the existence of payment troubles.

- The utility's outreach for the energy efficiency programs should be tied into other aspects of its customer service operations, including the management of arrears.

- The low-income energy efficiency investments should be delivered in collaboration and in partnership with existing energy efficiency and affordable housing programs.

Question No. 13.1

Should there be a minimum amount of funds, savings target, or TRC benefits directed toward low-income natural gas customers?

Energy efficiency programs funded and implemented by Ontario's natural gas utilities should fund the direct participation of low-income customers for two reasons. First, unless specifically funded, low income consumers are systematically excluded from these energy efficiency programs, even though they pay for them. Second, low income energy efficiency programs reduce total expenses of the public utilities. Accordingly, there should be a minimum amount of funding directed toward low-income natural gas customers. Each of the reasons supporting this conclusion is reviewed below.

Low-income energy efficiency programs should deliver a full range of efficiency services. These services would include, but not be limited to energy audits and air sealing, weatherization, insulation, heating and cooling system replacement with high efficiency equipment, hot water heater replacement, and appliance upgrades.

1. LOW-INCOME EFFICIENCY PROGRAMS ARE NEEDED IN ORDER TO PREVENT THE SYSTEMATIC EXCLUSION OF LOW-INCOME CUSTOMERS.

Making utility-funded energy efficiency programs accessible to low-income households does not "just happen." Indeed, without specific programs directed toward low-income customers, these programs tend to exclude low-income customers from participation, even though they pay for them through the rates. Low-income customers are systematically excluded because of market barriers that are unique to low-income households.

Market barrier issues are of particular importance to the low-income community. Low-income households inherently tend to be non-participants in utility-financed energy efficiency programs.

Accordingly, even though the savings generated by energy efficiency measures are "system" benefits, and even though the low-income ratepayers are paying "their share" of the costs, these low-income ratepayers are systematically excluded from receiving "their share" of the benefits.

In addition to market barriers common to all residential ratepayers, low-income households have market barriers that are different from, and more extensive than, residential households in general. The result of these market barriers is to more severely restrict the accessibility of energy efficiency measures to low-income households than to residential households in general.

An identification of market barriers common to residential customers generally is set forth below in Table 1. An identification of markets barriers common to low-income residential customers in particular is set forth in Table 2.

Three illustrative "market barriers" are discussed in more detail below:

- Discount rates/payback periods;
- Liquidity; and
- Tenancy.

Table 1
Residential Market Barriers

1. Information access. Consumers do not have free access to information on capital/operating tradeoffs. There is an implicit cost in time and effort to obtain this information.

2. Uncertain technologies. Consumers have little direct, first-hand experience with new technologies, particularly concerning performance, reliability and operating costs. Information may often be supplied by manufacturers whose credibility is suspect.

3. Consumer credit. The ability to invest in DSM measures often depends on having access to credit. However, consumer credit is often limited by financial institutions that disregard the value of conservation investments.

4. Lack of knowledge: Energy reductions are not always identifiable in the customer's bill. Accordingly, it is sometimes not possible for a customer to make a decision as to the economic viability of conservation programs.

5. Unfavorable payback periods: Even though some conservation measures may be justified when viewed in light of systemwide savings, they may not be when viewed in terms of customer-specific savings.

6. High initial capital cost: Even in the event that a measure is cost-justified in the long-term, if the initial capital cost exceeds the ability of a customer to finance, the measure will not be implemented.

7. Difficult installation: Just as there are implicit costs in time and effort to obtain conservation information, there are implicit costs of installation. As these costs go up, the extent of measures installed will go down.

8. Limited or no commercial availability: Even if cost-effective, some demand side measures have a limited (or no) commercial availability to a utility's customers. Often, availability will follow demand, but demand, in turn, is dependent upon availability.

9. Social factors such as education, language and age. These factors may prevent consumers from having access to demand site management measures.

Table 2
Low-Income Market Barriers

1. Low-income homeowners are reluctant to borrow, even interest-free, to invest in conservation.

2. Low income homeowners have extremely high required returns on investment.

3. Given their lack of liquidity, low income residents cannot hire a contractor as readily as those with greater means.

4. Tenants have little or no incentive to improve the landlord's property.

5. Tenants often have insufficient tenure at a particular service address to cost-justify conservation improvements.

6. Landlords owning housing occupied by tenants whose energy use is individually metered have little incentive to invest in conservation improvements.

7. Lower income households generally have less education than higher income households and, as a result, are perhaps less aware of the cost savings that energy investments can produce. The lack of education could also make it more difficult to perform the calculations necessary to determine whether a conservation investment is advantageous.

- **Discount Rates:** Low-income households tend to have extremely high implicit discount rates (also sometimes known as hurdle rates or internal rates of return). In a report for the Electric Power Research Institute (EPRI), Cambridge Systematics found that the implicit discount rate for low-income households ranged up to the 80 - 90 percent level, an implied payback period of roughly one year. For residential households in general, however, the hurdle rate for energy efficiency investments was 30 percent; that translates into a payback period of roughly three years. To the extent that an efficiency program strives to bring an energy efficiency investment only within the 30 percent range, that program, by implication, is inaccessible to all households that have a higher hurdle rate. One entire category of households to whom the program is inaccessible consists of low-income households.

- **Liquidity:** Low-income households tend to have extremely low liquidity. The payback period for any particular energy efficiency measure becomes irrelevant if the household does not have the investment capital with which to begin. The impact of this market barrier, for example, is often ignored in the reliance on appliance rebate programs. Such a program may pay the incremental cost of moving a customer from the purchase of a *less* energy efficient new water heater to the purchase of a *more* energy efficient new water heater. In such a program, if the less efficient water heater costs $600 and the more efficient system costs $800, it may well be cost-effective for the utility to pay the $200 difference to prompt the purchase of the more efficient system. This program, however, will, by definition, exclude households that are not in the market to purchase a new water heater with which to begin. It is axiomatic to note that not many low-income households recently spent $600 for a new water heater.

- **Tenancy:** Low-income households tend to live in rental dwellings. This finding has significance in two respects for the design of accessible energy efficiency programs. First, tenants have little or no incentive to improve their landlord's property. They do not receive any of the increased value of the property and, in fact, may face rent hikes as a result of the improvements. Second, low-income tenants tend to be more mobile. In the U.S., data demonstrates quite clearly that, compared to the roughly twelve percent of the total population that change residences each year, nearly one-quarter of the low-income population moves. As a result, even in those instances where a tenant may wish to invest in an energy efficiency measure, and assuming a financial ability (*e.g.*, sufficient liquidity) to do so, the payback period required to justify such an investment would need to match the household's tenure. A low-income household, in other words, will not invest in a measure with a two-year payback if that household tends to move to a different dwelling every 12 months.

There are serious impacts that arise from a failure to recognize and affirmatively compensate for the market barriers that make utility-funded energy efficiency programs inaccessible to low-income customers. Two impacts are of particular significance for the Ontario Energy Board's consideration.

- First, distributional inequities arise. Without compensating for these market barriers, a utility would have created an income transfer in the wrong direction. Low-income customers would be paying for the efficiency programs, but would be excluded from participating in those programs.

- Second, from a resource planning perspective, the full potential of energy efficiency measures would not be exhausted. If there are energy efficiency measures to be implemented, but which are not being implemented because the market and physical barriers that prevent their implementation have not been addressed, there remains some inefficiency on the utility's system.

The information and analysis presented above lead to the conclusion that the Ontario Energy Board should require the implementation of energy efficiency programs directed specifically toward low-income customers. The Energy Board should require utility programs that will specifically make energy efficiency programs funded by natural gas utilities accessible to low-income customers.

2. LOW-INCOME EFFICIENCY PROGRAMS ARE IMPORTANT TOOLS TO USE IN THE REDUCTION OF OVERALL UTILITY EXPENSES ASSOCIATED WITH SERVING LOW-INCOME CUSTOMERS.

The delivery of energy efficiency investments to low-income customers not only yields resource conservation and avoided cost benefits to the affected utility, but delivers a broad range of other utility cost reductions as well. Accordingly, low-income energy efficiency programs should be implemented not only as a resource efficiency measure, but also as an important tool in controlling other systemwide utility costs. Avoided costs commonly associated with low-income energy efficiency would include savings such as reduced arrears, reduced working capital, reduced credit and collection expenses, and the like.

In this fashion, low-income energy efficiency programs are closely akin to low-income rate affordability programs in their ability not only to serve the social function of addressing energy unaffordability problems, but also in serving the business purpose of reducing the business costs associated with an inability-to-pay.

The existence of direct financial benefits to utilities arising from energy efficiency programs targeted specifically to low-income households has been recognized for nearly 20 years. The presence of such avoided costs was first postulated in 1987. That analysis stated that targeted electric energy efficiency programs had advantages that went beyond the traditional energy and capacity savings associated with energy efficiency measures:

> The cost-effective reduction of system costs is relevant and important in every part of the business operations of the utility, not simply to the power supply function. Accordingly, a utility should be concerned with the problem of nonpayment, overdue payment, and partial payment of utility bills. Bad debt arises when ratepayers demand power from the system and then do not pay for it on a timely basis. * * * [A] new conservation program [can be proposed] that is justified on an avoided cost basis. The proposal rejects the historical view that avoided costs include only an energy and a capacity component. Instead, it introduces the notion of avoided bad debt. As long as the energy efficiency program costs less than the bad debt it will avoid, the program is cost-justified.[2]

In this 1987 article, "bad debt" was a defined term, defined to include all aspects of costs associated with payment troubles. The term was used to include not only written-off accounts, but credit and collection expenses, working capital expenses, and a host of other expenses related to nonpayment. An analysis of the working capital cost savings generated by energy efficiency investments targeted to low-income consumers is set forth in Appendix A.
Since that time, the existence and importance of such expanded avoided costs has become generally-accepted. Analysts have since repeatedly confirmed that low-income energy efficiency generates benefits beyond simply energy and capacity savings. A selection of utility programs that have explicitly documented the beneficial impacts discussed above is presented in Appendix B below.

In Ontario, the importance of targeting energy efficiency investments to high use low-income consumers will soon become even more important. Historically, low-income households that rented their homes did not pay their home energy bills directly to the utility company. Instead, these consumers had their home energy costs included in rent. Recent legislative changes,[3] will allow landlords to install meters providing for the tenant purchase of utility service. As a result, both the low income inequities, and the business costs associated with that unaffordable home energy, will see a substantive increase.

[2] Roger Colton and Michael Sheehan (1987). "A New Basis for Conservation Programs for the Poor: Expanding the Concept of Avoided Costs," 21 ***Clearinghouse Review*** 135, 139.
[3] Bill 109 Residential Tenancies Act, 2006 passed second reading in the Ontario Legislature on May 17, 2006. Section 137 allows a landlord who has an obligation to supply electricity to a rental unit to terminate that obligation, without the consent of the tenant, by giving the tenant adequate notice and reducing the rent in accordance with rules prescribed by regulations.

"Balance-Tippers"

Finally, making a utility's energy efficiency program accessible to low-income households generates substantial benefits that, while often difficult to quantify, may flow back to the utility in indirect, even if consequential, ways. These benefits are no less real or substantial because they may be indirect rather than direct in nature. These benefits can be referred to as "balance tippers." In assessing whether a targeted low-income energy efficiency program is "cost-effective," these balance-tippers should be qualitatively considered as a further justification for a program. Two illustrations of "balance tippers" are provided below. These are intended to be only examples, and do not represent a comprehensive list.

- Providing utility-funded energy efficiency measures for low-income rental housing should be given particular consideration by utilities. Because buildings are occupied by primarily low-income tenants, these programs are severely needed and difficult to obtain. Low tenant income is generally accompanied by low rent rolls and low rents are generally only available in older, deteriorated building stock. Antiquated and deteriorated building energy components and systems are inefficient and expensive to operate. These economic conditions conspire to weaken the net operating income and cash-flow and threaten the future of the building as a source of habitable housing. Energy efficiency investments can serve not only a a resource conservation measure in such housing, but as a load preservation strategy as well.

- Providing energy efficiency improvements serves economic development goals as well. Well-designed energy efficiency programs have been shown to produce substantial economic benefits for local economies. Electric and gas utilities are poor performers in terms of their ratios of in-state jobs to sales and sales to in-state income generation. By comparison, the industry that does most of the home energy efficiency work – the maintenance and repair construction industry – has almost four times the jobs-to-sales ratio of the utility industry, and a 20 percent higher ratio for in-state income generation per dollar of sales.

The "balance tipper" impacts of these considerations should be evident. To the extent that reduced operation costs through energy efficiency improvement can help make rental buildings "bankable," or can help expand the debt service that building owners can carry, the efficiency improvements help contribute to maintaining the economic viability of neighborhoods, and the source of affordable, stable, long-term housing for its customer base. In this sense, the energy efficiency not only benefits the owners and tenants, but helps contribute to the utility's own long-term economic viability. In addition, to the extent that low-income energy efficiency helps create additional jobs and economic activity within the utility service territory, the utility will directly benefit by increased sales (and increased revenues).

In sum, LIEN recommends that funding for low-income energy efficiency programs should be made available in the amount needed to make DSM programs fully accessible to low-income residential customers. Where low-income consumers cannot access energy efficiency pograms, Ontario's utilities should spend additional funds to ensure that programs *are* fully accessible.

Question No. 13.2

How should eligibility be determined for a low-income energy efficiency program?

Determining the eligibility for participation in a low-income energy efficiency program has several components to it. On the one hand, eligibility should be determined based on income considerations. In addition, however, low-income efficiency programs should have a *targeting* component to them. A utility-funded efficiency program directed toward low-income customers should be explicitly *targeted* to help advance the resolution of payment troubles and improve the affordability of home energy in addition to simply reducing home energy usage. In addition, utility-funded low-income energy efficiency programs should have a component explicitly targeted to piggyback with existing housing programs.

1. Identifying Basic Income Eligibility.

Basic eligibility for low-income energy efficiency programs funded by Ontario's natural gas utilities should be set at 125% of the Low-Income Cutoff. For a family with three persons living in a community of fewer than 30,000 persons, the 2004 LICO is $24,375. For a family of four in the same size community, the LICO is $29,596. The table below sets forth the LICOs for 2004. As can be seen, with households that have three or fewer persons, which covers the typical household in Ontario, the LICO for each type of area (except for communities with a population over 500,000) is significantly less than $30,000. Only when household sizes reach a minimum of five persons do LICOs for all urban areas exceed $30,000. Only when household sizes reach a minimum of six persons do all LICOs exceed $30,000.

Before Tax Low-Income Cut-Offs (LICOs), 2004					
	Population of Community of Residence				
Family Size	Rural	Urban Areas			
		Less than 30,000	30,000 - 99,999	100,000 - 499,999	500,000+
1	$14,000	$15,928	$17,407	$17,515	$20,337
2	$17,429	$19,828	$21,669	$21,804	$25,319
3	$21,426	$24,375	$26,639	$26,805	$31,126
4	$26,015	$29,596	$32,345	$32,546	$37,791
5	$29,505	$33,567	$36,685	$36,912	$42,862
6	$33,278	$37,858	$41,375	$41,361	$48,341
7+	$37,050	$42,150	$46,065	$46,350	$53,821

Using the LICO as the demarcation of eligibility for low-income efficiency programs is recommended because a household living with income below current LICO will most likely face the market and physical barriers identified above that make energy programs inaccessible to the household. Moreover, a household living with income below current LICO will most likely serve the additional business-related purposes involving the reduction of costs associated with nonpayment.

Wherever an income eligibility line is drawn, however, there will be some households that have incomes marginally in excess of that line. It would be appropriate (and LIEN endorses) the set-aside of a pre-determined proportion of low-income energy efficiency funding for households that have income marginally in excess of LICO.

In addition to defining income eligibility, an equally important task is to define the population to which the low-income energy efficiency programs will be *targeted* even within the total eligible population.

2. Targeting Based on Customer Characteristics.

Maximizing benefits to all utility customers, whether through reduced traditional avoided costs or through the reduction of costs associated with low-income payment troubles, is dependent upon an appropriate targeting of the low-income program. Two primary alternative decision rules exist to guide targeting a low-income efficiency program:

- To target those with the highest energy usage, believing that these households present the greatest potential for energy savings; or

- To target those with the greatest payment problems, believing: (a) that payment problems and high usage are positively associated; and (b) that these households present the greatest potential for improved energy affordability.

To a certain extent, the difference between the two principles is artificial if one accepts the premise that energy efficiency measures can not only generate traditional avoided costs, but can generate avoided costs associated with a reduction in payment troubles as well. It has become well-established over the years that payment-troubles are often associated with higher than average utility consumption. By targeting customers with payment troubles, in other words, a utility implicitly targets its high use customers as well.

The Pennsylvania Public Utility Commission (PUC) has explicitly considered this tie-in between high usage and payment-troubles and the use of each for implementation of the Pennsylvania Low-Income Usage Reduction Program (LIURP). The Pennsylvania PUC found as follows:

> . . .we would like to clarify the distinction between LIURP eligibility criteria and the prioritization criteria for the receipt of program services. LIURP eligibility criteria has evolved into a two-part requirement. First, income must be at or below 150% of the federal poverty guidelines. There is an exception to this rule. Up to 20% of the LIURP budget may be spent on customers with an income level in the range 150% to 200% of the federal poverty level. Second, the LIURP experience over the past nine years has shown that high usage is the strongest predictor of high energy savings. Consequently, each of the major electric companies has established company specific minimum usage requirements for each of the three major job types for electric jobs: heating, water heating and baseload. The bottom line is that all income eligible customers do not have a usage profile that warrants the provision of LIURP services.
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> Prioritization for the receipt of program services is as follows. Most importantly, usage is the driver. Once again, we emphasize that in the actual delivery of LIURP services, each electric company has established minimum usage guidelines for each of the three electric job types. It is only after the usage requirement is met that the prioritization scheme is applied. The prioritization process follows two steps. First, among customers meeting the threshold for usage, participation is further prioritized from highest arrearage to no arrearage. Second, a further prioritization is done to further delineate equal usage and equal arrearage candidates. This is done by prioritizing from lowest to highest income.
>
> We have provided this explanation to illustrate that we do not need to specify negative ability-to-pay customers because ability to pay is neither an appropriate eligibility requirement nor a prioritization issue for LIURP. Instead, high usage is the most important eligibility requirement for customers who meet the income guidelines.
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> * * *
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> The primary goal of LIURP is to achieve bill reduction through usage reduction. We have elaborated above that high usage is the best indicator for achieving this primary goal of LIURP. Another LIURP goal states that the reduction in energy bills should decrease the incidence and risk of customer payment delinquencies and the attendant utility costs associated with uncollectible accounts expense, collection costs and arrearage carrying costs. In view of this program goal, arrearage prioritization has been appropriately listed as the first prioritization among the highest users.[4]

[4] Pennsylvania Public Utility Commission, Re Guidelines for Universal Service and Energy Conservation Programs, No. M-00960890, 178 P.U.R.4 508 (July 11, 1997).

LIEN commends the above-quoted Pennsylvania PUC language for consideration by the Ontario Energy Board. An identical two-step process (involving: (1) eligibility-setting; and (2) priority setting amongst eligible customers) should be adopted in Ontario.

- Basic income eligibility should be set at 125 percent of the Low-Income Cutoff by the Ontario Energy Board;

- Approval should be given for a modest set aside for customers with income marginally in excess of this income level;

- Prioritization should be directed toward the customers that are the highest users;

- Amongst equally-situated high users, if additional prioritization is necessary and appropriate, priority should be given to high users with the highest arrears. This second prioritization, however, should only be implemented *given equally high usage*.

One corollary to the targeting of energy efficiency measures to high use, payment-troubled customers involves the benefits derived by a utility that seeks to fully integrate its energy efficiency functions with other low-income initiatives pursued by the company, itself. This integration may well most commonly fall within the marketing stage of the energy efficiency program.

The way to operationalize this is to inventory the non-energy efficiency programs that a utility offers to its low-income (or to its payment-troubled) customers, and then to assess whether targeted energy efficiency can help make those programs both more effective and more cost-effective.

Again, this process is perhaps best explained by illustration. The issue of a utility's obligation to integrate its offer of energy efficiency measures with its deferred payment plans for low income households, for example, was raised in a 1991 rate case involving Central Maine Power company (CMP) before the Maine Public Utilities Commission (PUC). In that proceeding, the staff of the PUC submitted testimony concerning CMP's marketing of "energy management services" to low-income customers.

According to information presented in that proceeding, there is a positive correlation between high arrears balances and high usage. The company, according to the PUC staff, "should pursue the implications of the [recent study of payments plans] and undertake a marketing effort that targets high use, low-income customers." The company, according to the staff testimony, was not effective in its marketing.

The state Office of Public Advocate agreed. According to that office, CMP could significantly reduce its write-offs and collection costs by providing energy management services to high usage customers on special payment arrangements. The Public Advocate said that the utility could have saved as much as $2 million a year "if CMP ha(d) been successful in delivering its Insulation Plus and Bundle Up programs to its special payment arrangement customers."

The Maine PUC acted favorably on the criticisms of the lack of action by Central Maine Power. According to the Commission:

> The successful marketing of energy management programs to low-income customers, particularly low-income customers on special payment arrangements, has a clear benefit above and beyond the capacity or energy savings generally associated with demand-side management programs. Low income customers that see a reduction in their bills will be able to manage their bills better. The Company's carrying costs associated with late-paid bills and uncollectibles, which are generally passed on to other ratepayers, should be reduced.

The PUC directed the company to take remedial action.

In sum, aside from the issue of appropriately targeting its low-income energy efficiency program, one final question to be pursued in designing a utility-funded low-income energy efficiency is whether the utility has adequately integrated its low-income energy efficiency program into all aspects of the company's operation. As illustrated by Maine's special payment arrangements, it is possible for a company to use low-income energy efficiency to improve the efficiency and effectiveness of other customer service activities directed toward low-income payment-troubled customers.

3. Targeting Based on Program Characteristics.

In addition to delivering energy efficiency measures to low-income customers, as targeted by high usage and arrears, low-income energy efficiency programs should be piggy-backed with non-utility-funded efficiency programs. The low-income energy efficiency programs should implement appropriate piggyback initiatives to help increase a program's cost-effectiveness and scope. These piggyback initiatives should involve the existing energy efficiency programs (to the extent that they exist), as well as affordable housing initiatives.

One approach is to combine utility energy efficiency dollars with dollars in existing home repair, housing rehab, and first time homebuyer programs to form a single comprehensive program. In this fashion, utility funds can be used on cost-effective energy savings measures. In contrast, the housing dollars will be used as the source of funding for the non-energy savings components of the total program.[5] The combination of housing programs dollars with utility dollars will eliminate parallel programs by the utility and the government. Instead, a single program will be created serving the combined populations of what the two programs would have served separately. The allocation of particular expenses to the housing program's responsibility or to utility responsibility

[5] Non-energy program components would include, for example, outreach and intake, minor non-energy saving housing repairs, health and safety upgrades, and the like.

will be an accounting function of which the low-income household is not aware. A utility's low-income energy efficiency programs should implement appropriate piggyback initiatives to help increase a program's cost-effectiveness and scope.

Making energy efficiency programs accessible to low-income customers as part of a piggy-backed housing programs offers substantive advantages to the utility. Two particular challenges are presented by low-income energy efficiency programs: (1) the high relative transaction costs; and (2) the need for non-energy-saving home repairs. Pursuing piggyback opportunities addresses both of these issues.

High transaction costs: A minimum amount of energy savings is necessary in order for a utility providing energy efficiency measures to recoup sufficient cost savings to overcome the fixed costs of program outreach and administration. Experience shows, however, that the costs of program outreach and administration do not vary depending upon the amount of savings generated at a particular dwelling unit. The time devoted to intake is the same, the time devoted to oversight and monitoring is the same, the time devoted to travel is the same. If anything, transaction costs for low-income households may be somewhat higher than for moderate and upper income households. These fixed costs are referred to as transaction costs. With the small energy savings potential for low-income households, utilities often find that there is insufficient potential for savings to overcome the transactions costs of providing the energy efficiency measures to the low-income household in the first instance.

Non-energy-savings repairs: A second problem experienced by low-income energy efficiency programs is the frequent need for home repairs to occur before energy savings measures will have any impact. It makes no sense, in other words, to install insulation into a roof when there are holes in the roof with which to begin. Similarly, installing a new or repaired heating system will have no impact if there are structural problems with the house that eliminate the new system's effectiveness.

The problem is that while these home repairs may be a necessary precondition to the effective installation of energy savings devices, they do not save energy unto themselves. Every dollar spent on such repairs, therefore, adds a dollar of expense that must be offset by the energy savings generated by the energy efficiency measures themselves. Given the problem first discussed above – that low-income households frequently present small savings potential with which to begin – the it is entirely possible that the cost of home repairs can not be added to the utility program and have that program remain cost-effective.

The utility is thus caught in a classic Catch-22 with low-income households. Without the home repairs, the energy efficiency measures will not be effective, and thus cannot meet the cost-effectiveness tests. However, with the home repairs, the overall cost of the program will possibly outstrip the overall savings, again with the program thus failing a cost-effectiveness test.

Because of these factors, Ontario's natural gas utilities should seek to piggyback their energy efficiency programs along with affordable housing initiatives. The term "low income housing developers" encompasses a wide range of for-profit and non-profit institutions using a wide range of public and private dollars. This discussion is not intended in any fashion, to be a comprehensive review of the potential of utilities to work with low-income housing developers. Indeed, one basic component of any utility low-income energy efficiency program in Ontario is to do an "institutional inventory" of the capacity to deliver low-income energy efficiency to housing developments (whether new construction, moderate, or substantial rehabilitation).

A utility partnership with local affordable housing programs funded with national, provincial and/or local dollars could operate in one of two ways. First, the utility efficiency program could fund a final blower-door-aided energy audit on all new construction and substantial rehabilitation. Efficiency professionals recognize that even new construction leaves substantial air leakage that would generate energy loss for occupants (and thus decrease the affordability of the newly-constructed home). In addition, a utility could provide efficiency rebates that would move a home newly constructed (or substantially rehabbed) using affordable housing program funds to prescribed energy efficiency standards.

The guideline that should be adopted to govern utility-funded energy efficiency programs in Ontario is one requiring utilities to take advantage of all reasonably available partnerships that will leverage the utility efficiency dollars, improve cost-effectiveness, and/or generate substantive program benefits to the utility and its low-income customers.

Question No. 13.3

How should target levels for low-income energy efficiency programs be determined?

One of the key questions, perhaps *the* key question that regulators must resolve in considering utility-financed DSM programs is the proper funding of the low-income component.

At a minimum, funding for low-income efficiency improvements should be the amount that is required to make DSM programs fully accessible to low-income residential consumers. Where low income consumers cannot access conservation techniques, the utilities need to spend additional funds to ensure that programs are fully accessible.

Programs are fully accessible to the extent that the utility funding the program increases its low-income DSM budget until the company exhausts its cost-effective measures, or until it exhausts the institutional capacity to deliver cost-effective measures, whichever comes first.

- Increasing low-income energy efficiency funding until a utility exhausts its institutional capacity to deliver cost-effective measures is needed to ensure that there are no lost opportunities in any given year. Lost opportunities arise when the accomplishment of some given task precludes the future accomplishment of additional work at that same dwelling. One frequent source of lost opportunities involves the failure to exhaust the institutional capacity to deliver low-income energy efficiency measures. Assume, for example, that the institutional capacity of low-

> income service providers is 8,000 homes per year in a given utility service territory. These service providers might include local contractors, community-based organizations (CBOs) involved with delivering conservation and load management services through the Green Communities program, and other for-profit or non-profit institutions. If the combined budget of low-income programs funds only 6,000 homes a year, there is a lost opportunity to increase the energy efficiency in 2,000 homes. By assumption, the maximum capacity is 8,000 homes per year. That capacity thus cannot be pushed to 10,000 for a year to "make up" the earlier lost opportunity.

As can be seen, one component of a utility low-income energy efficiency program is a periodic inventory of the institutional capacity to deliver low-income energy efficiency measures. The inventory should cover the planning period of the utility. If the utility files three-year energy efficiency plans with regulators, in other words, its inventory should include the existing and projected capacity to deliver low-income services over that three-year period. The budget for low-income energy efficiency should be sufficient to finance full utilization of the inventoried capacity. A periodic inventory is necessary because institutional capacity frequently mirrors the available resources. Institutional capacity to deliver cost-effective energy efficiency measures may, at the beginning of the program, be low because the resources have not previously been available to expand that capacity. If, however, a designated amount of resources is committed over a designated planning period, the capacity can be increased to allow full utilization of those resources.

In Ontario, it is particularly important not to allow prior insufficient funding to artificially limit the future ability to build capacity to deliver cost-effective low-income energy efficiency. Information provided by Enbridge Gas Distribution Inc (May 30, 2006) reports that in 2005 it spent 2.7% of its entire DSM budget on supporting low-income customers.[6] EGD's low-income expenditures represent 0.014% of its total revenues. In contrast, U.S. jurisdictions spend roughly 10 - 15% of their energy efficiency budgets on low-income programs. In Pennsylvania, natural gas utilities are required to spend 0.2% of their revenue on low-income efficiency programs. As utilities such as EGD increase their budgets, they will also increase the capacity to deliver low-income efficiency programs. The test of full accessibility should reflect that increasing capacity over time.

A second component of a utility low-income energy efficiency program is a periodic inventory of the lost opportunities inherent within the existing delivery of energy and housing services. As with the institutional capacity inventory, if a utility files a three-year energy efficiency plan with regulators, its inventory of lost opportunities should cover a three-year period.

[6] Response to an information request by LIEN from Patricia Squires, Manager Mass Markets and New Construction Market Development, Enbridge Gas Distribution Inc to Juli Abouchar, May 30, 2006 (updated June 1, 2006) attached as Appendix C

In sum, the proposed decision rule is that funding for low-income energy efficiency improvements should be the amount that is required to make DSM programs fully accessible to low-income residential consumers. Full accessibility is determined by whether utility funding is sufficient to ensure that there is no unused institutional capacity to deliver cost-effective low-income energy efficiency service over a reasonable program planning period. Stated another way, funding should be adequate such that no lost opportunities occur within the realm of cost-effective low-income energy efficiency. The local utility's low-income energy efficiency budget should increase until the company exhausts its cost-effective measures, or until it exhausts the institutional capacity to deliver cost-effective measures, whichever comes first.[7]

[7] Full accessibility must be measured in terms of the institutional capacity to deliver cost-effective measures. A program cannot be required to deliver more efficiency measures than the program delivery network has the capacity to deliver.

RECOMMENDATIONS

In sum, the following critical components of the natural gas utility demand side management program are supported by the discussion above:

- At a minimum, funding for low-income efficiency improvements should be the amount that is required to make DSM programs accessible to low-income residential consumers. Where low income consumers cannot access conservation techniques, the utilities need to spend additional funds to ensure that programs are fully accessible. "Accessibility" is to be determined by whether there are untapped cost-effective measures that can be implemented and whether the institutional capacity exists to deliver those cost-effective measures;

- Efficiency investments should be targeted on the basis of high usage, but on the existence of payment troubles as well;

- A full range of conservation and demand services should be delivered, including but not limited to energy audits and air sealing, weatherization, heating and cooling systems, and appliance upgrades;

- Basic income eligibility should be set at 125 percent of the Low-Income Cutoff. A designated proportion of total low-income funding should be set aside for households with incomes marginally exceeding the Low-Income Cutoff;

- Efficiency investments should be targeted not only on the basis of high usage, but also on the existence of payment troubles;

- The utility's outreach for the energy efficiency programs should be tied into other aspects of its customer service operations, including the management of arrears; and

- The low-income energy efficiency investments should be delivered in collaboration and in partnership with existing energy efficiency and affordable housing programs.

Appendix A
Working Capital Savings Arising from Low-Income Energy Efficiency Programs

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This Appendix explains the working capital savings that are generated by the implementation of low-income energy efficiency programs. It has been documented that programs such as these directed toward low-income households who cannot afford to pay their bills will generate certain cost savings for the utility offering the program.

One of the savings generated by such programs involves a reduction in the working capital allowance required by the utility offering the program. The working capital allowance takes into consideration the fact that low-income households who do not pay their bills in a full and timely fashion force the utility to pay its own debts prior to the receipt of revenue from its customers. By reducing energy usage, bills are brought down to more affordable levels. This improvement in affordability helps participating low-income customers reduce arrears and, accordingly, reduce the working capital expense experienced by the utility in carrying those arrears. As discussed in the next appendix, numerous utility energy efficiency programs have documented this improvement in payment patterns resulting from utility-sponsored energy efficiency programs.

Defining Working Capital

One utility financial text has explained "working capital" needs as follows:

> A part of the rate base is not for investment in property but for investment in working capital. Working capital allowance in the rate base includes any investor-contributed capital needed for cash balances to meet expenses as they come due, prepayments such as insurance premiums, materials and supplies inventories, and minimum or compensating bank balances.[8]

According to this text, "cash working capital is the amount of money necessary to meet bills as they come due between the rendition of service and the receipt of revenues therefrom."[9]

It makes no difference for purposes of calculating the working capital impact of low-income arrears whether a utility uses its own dollars or borrows money to pay its bills. If the utility does not fund its working capital allowance out of cash-on-hand, the working capital is made part of the company's rate base. The return on the working capital is thus the utility's weighted rate of return (debt, equity, preferred equity). In contrast, if the company is so "cash rich" that it does not have a working capital allowance, the prepayment of bills and the like discussed above will impose an opportunity cost on the company, denying it the return on investment that it *would have received*

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8. Eugene Rasmussen and Keith Howe (1983), ***Public Utility Economics and Finance***, at 92-93, New York: Prentice-Hall.
9. *Id.*, at 93.

had it not been required to use some portion of its cash to prepay bills for which it had not yet received revenue from its customers.

The Revenue Requirement Impact of Working Capital

The fact that working capital becomes part of a utility's rate base is significant in that its revenue requirement impact exceeds the actual dollars of working capital required. This increased revenue requirement results from the tax impact associated with the equity return received on the working capital. Explanation is best accomplished through use of an illustration.

Assume that the company needs $1000 in working capital. Accordingly, there is an addition to rate base of $1000 on which the company will earn a return the same as any investment in property. Assume that the company has a 50/40/10 equity/debt/preferred equity split. This means that 60 percent ($600) of the working capital will receive an equity return. Assume finally that the annual cost of equity for the company is 12 percent (simply to make the calculation easier). The equity return on the working capital will thus be $72 ($600 x .12 = $72). The debt return, given an assumed weighted interest rate of nine percent (9%), will be $36 ($400 x .09 = $36). As is thus apparent, the total return on investment associated with this $1000 working capital is $108 ($72 + $36 = $108).[10]

The *revenue requirement* impact of this return, however, is quite different. The reason for this can be attributed to the tax effect on the equity return. A utility's equity return, of course, is its "profit" (or net income). As such, there will be both a federal and state income tax levied upon it. A generally accepted combined federal/state income tax rate today is 42 percent. What this means is that 42 percent of all net income generated by a utility will be paid to the state and federal governments in income taxes. In order for the utility to generate one dollar ($1) to distribute to investors as dividends, therefore, the utility must collect something *more* than one dollar in rates. In fact, what that "something more" is involves a dollar amount such that once the 42% tax is subtracted, what is left will be the one dollar. The easy way to determine what the dollar amount is involves simply dividing the desired return by (1 minus the tax rate). In the case of a $1 return, and a 42% tax rate, the calculation would be $1 / (1-.42) = $1 / .58 = $1.72.[11] What this means is that $1.72 - (.42 x $1.72) = $1.

[10.] The same result would have been obtained by calculating the weighted cost of capital. The three assumptions for this analysis include: (1) a capital structure of 60/40 (equity/debt); (2) an equity return (common plus preferred) of 12%; and (3) an interest rate of nine percent (9%). The weighted cost of capital would thus be: (60% x .12) + (40% x .09) = .072 + .036 = .108. The weighted return would thus be $1000 x .108 = $108.

[11.] If the combined federal/state tax rate is only 35 percent, the calculation would be $1 / (1 - .35) = $1 / .65 = $1.54. What this means is that $1.54 - (.35 x $1.54) = $1.

To go back to our working capital discussion, in order to generate sufficient *pre*-tax dollars to provide an after-tax profit of $72, therefore, the company must charge $124.14. This involves the $72 profit *plus* a tax effect of $52.14. Remember, the tax is *not* 42 percent of the profit; simply multiplying $72 by .42 will give a tax of $30.24, which understates the tax liability by more than $20. Instead, the tax is 42 percent of the total billed revenue such that the profit is left after the 42 percent is subtracted.

In sum, the annual working capital requirement of $1000 will yield a total rate impact of more than $160 for the associated rate of return. This includes:

TABLE A-1. Rate Impact of Annual Working Capital Return of $1000	
Interest on debt	$36.00
Return on equity	#72.00
Tax on equity return	$52.14
Total	$160.14

The Significance of Working Capital Return

In order to calculate the impact of this working capital analysis on a low-income program (be it a discount rate or an energy efficiency program), it is necessary to convert the annual cost of capital into a daily cost of capital. An annual weighted rate of return of 10.8 percent will translate into a daily weighted rate of return of .02959 percent (10.8% / 365 = .02959%).

This daily rate is then multiplied times the dollar lag days associated with low-income arrears. A 30-day arrears of $100 thus translates into 3,000 dollar lag days (30 x 100 = 3,000). When multiplied by the daily rate of return of .02959%, we find that the working capital associated with this arrears is $0.89. The tax effect for the working capital associated with this arrears is $0.43.[12] The total working capital revenue requirement impact of the $100/30-day arrears is $1.32. This total revenue requirement has three components as laid out in the Table below:

[12.] The tax effect must be calculated separately. This will involve multiplying the lag days times the percent funded by equity. This must be multiplied by the daily equity return (12%/365) and divided by .58. This gives the entire revenue requirement associated with the equity return. To isolate the tax impact, one then subtracts out the equity return itself. Hence, for purposes here, the equation would be:

((3000 x .60 x (.12/365)) / .58) - (3000 x .60 x (.12/365)).

In this equation, the revenue lags days equal 3000. The .60 is the portion of the working capital funded by equity. The .12/365 is the daily rate of return. The .58 is the factor needed to generate the total revenue requirement that includes the tax effect.

TABLE A-2. Rate Impact of 30-Day Arrears of $100	
Interest on debt	$0.30
Return on equity	$0.59
Tax on equity return	$0.43
Total	$1.32

It is possible to project this analysis out to an entire low-income population.[13] While to do so now for illustration will require some specific assumptions, it should be possible to collect the actual empirical data to make quite specific determinations. The primary information that is unavailable now is the rate at which low-income customers pay over time. For the sake of illustration, therefore, the following analysis takes actual data from a Philadelphia utility and assumes for current purposes that this data will accurately reflect a range of actual conditions on other utility systems.

The calculation below considers the rate of payment for the residential class. It begins by tracking the age of arrears for each month.[14] An average lag day value is then assigned to each aging category. This average lag day is simply the mid-point of the range.[15] The lag days are multiplied times the average bill for the particular month to obtain a total number of revenue lag days associated with that age of arrears. A working capital requirement for bills rendered in each month is then obtained using the procedure discussed above. The residential rate of payment is set forth in Table A-3 below.[16]

[13.] This is simply using the LIHEAP population as a surrogate for "low-income."
[14.] In fact, it takes an 18-month average calculated for the Philadelphia utility and applies it to individual months. In an actual empirical study, it would be possible to determine the aging process for each month. The high bill heating months, in other words, could reasonably be expected to have slower payments. These slower payments are not reflected in this analysis.
[15.] Thus, the average lag days assigned to arrears 61 - 90 days old is 75 days.
[16.] This includes the *total* residential class. It would be reasonable to expect that the low-income population would be somewhat slower in paying.

TABLE A-3. Illustrative Aging of Accounts	
Age of Arrears	Percent of Residential Accounts
0 - 30 days	47.10%
31 - 60 days	14.40%
61 - 90 days	4.45%
91 - 120 days	3.89%
121 - 240 days	8.79%
241 - 360 days	4.74%
361 - 48- days	1.71%
481 - 600 days	0.46%
601 - 720 days	0.06%
Remainder[17]	6.79%

The total low-income population is set equal to 19,000 households. The collection scheme is posited for only one month. Again, clearly, to do this for an entire year will be relatively easy with actual data. The method of calculation for a single month is set forth in Table A-4 below.

As can be seen, the total revenue requirement associated with the working capital return for this one month, given the collection scheme for the Philadelphia utility, will be in excess of $100,000. This is for billed revenues in that month of $3.8 million. This does not include the working capital associated with arrears carried over from any other month, only that associated with the revenue billed in this particular month.

Summary

The elimination or reduction of arrears attributable to a low-income program will have a significant effect on a utility's working capital needs. For every dollar of arrears that a utility can eliminate, the utility will reduce its working capital needs by reducing its revenue lag days. In addition to the carrying cost savings that will be generated by this effort, there will be an expanded revenue requirement savings, as the combined federal/state income tax effect on the equity portion of the cost of capital for the working capital is eliminated or reduced as well.

[17.] Since uncollectibles are funded in advance by creation of a reserve, there is no working capital associated with uncollectibles.

This appendix, however, has a limited purpose. It is not intended to quantify the extent of working capital savings for any particular utility. Instead, the actual numbers to run through this procedure, at this time, are not so important as recognizing and agreeing upon the appropriate procedure.

TABLE A-4. One Month Working Capital Rate Impact on Illustrative Aging of Accounts

Age of Arrears	Pct Residential Customers	Mean Lag Days	Daily Working Capital	Average bill	Low-Income Customers	Total Dollar Lag Days	Total Working Capital Return	Working Capital Components		Tax Effect	Total Working Capital Revenue Requirement
								Interest Return	Equity Return		
0-30	47.10%	15	0.02959%	$200	19,000	26,847,000	$7,944	$2,648	$5,296	$3,835	
31-60	14.40%	45	0.02959%	$200	19,000	24,624,000	$7,286	$2,429	$4,857	$3,517	
61-90	4.45%	75	0.02959%	$200	19,000	12,682,500	$3,753	$1,251	$2,502	$1,812	
91-120	3.89%	105	0.02959%	$200	19,000	15,521,100	$4,593	$1,531	$3,062	$2,217	
121-240	8.79%	180	0.02959%	$200	19,000	60,123,600	$17,790	$5,930	$11,860	$8,588	
241-360	4.74%	300	0.02959%	$200	19,000	54,036,000	$15,989	$5,330	$10,659	$7,719	
361-480	1.71%	420	0.02959%	$200	19,000	27,291,600	$8,075	$2,692	$5,384	$3,898	
481-600	0.46%	540	0.02959%	$200	19,000	9,439,200	$2,793	$931	$1,862	$1,348	
601-720	0.06%	660	0.02959%	$200	19,000	1,504,800	$445	$148	$297	$215	
TOTALS:							$68,667	$22,889	$45,778	$33,150	$101,817

Appendix B
Non-Energy Savings from
Low-Income Energy Efficiency Programs

The existence of indirect financial benefits to utilities arising from energy efficiency programs targeted specifically to low-income households was first postulated in 1987. In that analysis, low-income advocates stated that targeted energy efficiency programs had advantages that went beyond the traditional energy and capacity savings associated with DSM measures:

> The cost-effective reduction of system costs is relevant and important in every part of the business operations of the utility, not simply to the power supply function. Accordingly, a utility should be concerned with the problem of nonpayment, overdue payment, and partial payment of utility bills. Bad debt[18] arises when ratepayers demand power from the system and then do not pay for it on a timely basis.* * *[A] new conservation program [can be proposed] that is justified on an avoided cost basis. The proposal rejects the historical view that avoided costs include only an energy and a capacity component. Instead, it introduces the notion of avoided bad debt. As long as the conservation program costs less than the bad debt it will avoid, the program is cost-justified.[19]

The theory gained credence when two researchers in Minnesota and Wisconsin began to empirically find such savings associated with delinquent payments. According to Quaid and Pigg, traditionally, impact evaluations of low-income weatherization programs had focused on measuring energy savings, and had neglected quantification of other potential benefits.

> One such benefit relates to the financial aspect of reducing energy use. Low-income households often get behind in paying their bills. Reducing energy consumption in these households may set off a chain of impacts: lower, more affordable utility bills; fewer unpaid utility bills; lower past-due bills (arrearages); and ultimately, lower utility costs to process past-due accounts, and lower utility write-offs from uncollectible debts.[20]

The benefits identified are far from conceptual. Some utilities are beginning to capitalize on this recognition of the expanded avoided costs associated with conservation programs targeted to payment troubled households. The discussion below will set forth some of the research that has been done, or is being done, by various utilities in furtherance of this concept.

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[18]"Bad debt" was specifically defined in the article as the costs associated with delinquent payments. "The term `bad debt' in this article, therefore, is to be distinguished from its general usage as synonymous with `uncollectibles.'"

[19]Colton, R. and Sheehan, M. "A New Basis for Conservation Programs for the Poor: Expanding the Concept of Avoided Costs," 21 ***Clearinghouse Review*** 135, 139 (1987).

[20]Quaid, M. and Pigg, S. (1991). ***Measuring the Effects of Low-Income Energy Services on Utility Customer Payments***, Washington State Energy Office: Olympia, WA.

Columbia Gas Company of Pennsylvania

Columbia Gas of Pennsylvania has performed perhaps the most sophisticated analysis of arrears reduction associated with energy efficiency strategies directed toward low-income households. Columbia Gas began its evaluation with the proposition that:

> the realization that fuel savings often lead to reduced billings warrants the study of secondary and tertiary non-energy impacts. If reduced customer billings result from energy conservation programs, then it is reasonable to suggest that the utility has made its service more affordable for program participants.[21]

In its evaluation of the company's usage reduction efforts, evaluators introduced two measures: utility shortfall and customer billing deficit.[22] Utility shortfall is the difference between the billings and the total amounts applied to the account. Customer billing deficit is the difference between the billings and the amount paid directly by the customer (as opposed to being paid by public assistance and the like).

> We found that both utility shortfall and customer billing deficit were improved as a result of the 1990 LIURP. The control group had an average monthly utility shortfall equal to 3% of the average monthly billing during the pre-program period; this rose to a 10% surplus during post-program period. A similar change occurred for program participants, who went from a 3% utility shortfall to a surplus of 15 percent in the post-program period. This represents a control-adjusted improvement of 5%, which proved to be statistically significant.[23]

The *actual* expected improvement should be even more, Columbia Gas noted.

> Given that the average utility bill for program participants in the post-program period was $62, the expected total payments for the month would be $65 ($62 + 5%). We feel this amount could be improved. The LIURP participants lost significant amounts of state and federal [fuel] assistance relative to the control population. Since the change in assistance amounts is unexplained, it is possible to hypothesize that the levels of public assistance could remain constant between the pre- and post-program period. If that were the case, the expected monthly payment would have been $79--a surplus of $17 per month per participant.[24]

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[21] Monte de Ramos, K., *et al.*, "An Assessment of Energy and Non-Energy Impacts Resulting from the 1990 Columbia Gas Low-Income Usage-Reduction Program," ***Proceedings of the 1993 Energy Program Evaluation Conference***, at 771, Energy Program Evaluation Conference: Chicago.
[22] *Id.*, at 775.
[23] *Id.*, at 775.
[24] *Id.*

In addition to the utility shortfall, Columbia Gas had its second measure of payment improvement: the customer billing deficit. The utility found that this deficit was improved by 14 percent of the average monthly billing when compared to the control group. Participants of LIURP paid 58 percent of the average monthly billing in the pre-program period, while in the post-program period, LIURP participants paid 75 percent of the average monthly billing. This compared with the control group, which went from paying 64 percent of the average billing to 67 percent of the average billing. While the reduced billing deficit was statistically significant for the program participants, the control group change was not.[25]

> We found the levels of customer payment remained significantly constant for both the study group and control population through the pre- and post-program periods. As a result of LIURP, monthly billings were reduced for the program participants while the monthly billings remained constant for the control group. This allows the participants' payments, which remained constant, to represent a higher portion of the overall bill. This suggests that Columbia Gas of Pennsylvania improved the affordability of service for LIURP participants without substantive changes in customer payment behavior.[26]

Wisconsin Gas

Wisconsin Gas Company has implemented a pilot program explicitly designed to use conservation measures as a means to reduce the costs associated with delinquent payments and bad debt. The purpose of the study, Wisconsin Gas said, was "to examine the effects of Wisconsin Gas Company's Weatherization Program on the arrearages of low-income customers."[27] Wisconsin Gas divided its study homes into two groups: (a) single family homes; and (b) two-family homes.[28]

For single family homes, Wisconsin Gas experienced an overall therm savings of 23.4 percent.[29] Moreover, therm savings based on heat load were computed. The company produced "an overall single family heat load savings rate of 30.7 percent* * *."[30] Two-family homes generated similar results.[31]

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[25] *Id.*
[26] *Id.*
[27] *See*, ***Weatherization Arrears Savings***, Wisconsin Gas Company (April 1988).
[28] The company stated, however, that "due to the integrated nature of two-family energy use and weatherization measures, two-family accounts were treated as one dwelling unit." *Id.*, at 1.
[29] While the savings ranged widely between units, the company noted that 64 percent of the single family homes fell in the 10 percent to 35 percent savings range. *Id.*, at 2.
[30] *Id.* Again, while the savings ranged widely between units, 60.2 percent of the single family homes fell in a range of 25 percent to 50 percent savings.
[31] *Id.*, at 5. Over 70 percent of the dwellings fell in the 10 percent to 35 percent savings range.

Wisconsin Gas found that not only did the program reduce arrears for households, but the company recognized significant savings from the program as well. According to the company, the program reduced the customers with $100 of annual arrears by nearly 300 percent.[32] Moreover, Wisconsin Gas found that it received a 20 percent return on its weatherization investment, strictly from the reduced nonpayment, and before considering traditional avoided costs, in the first year of the program.

In sum, Wisconsin Gas concluded from its study:

> The study indicates that single family dwellings generated on average $353 less annual arrears after weatherization. For the two family group, weatherization reduced arrears $502 annually. Taken a step further, for 1,300 dwellings weatherized annually and split evenly between single and two-family jobs, over $550,000 in billed arrears or approximately $360,000 in gas cost would have been avoided.[33]

Finally, Wisconsin Gas concluded, "within the parameters of this study, 20 percent of the study group would have generated $0 or less annual arrears with weatherization as compared to 5 percent without. This reflects favorably on weatherization potential as an arrears eliminator."[34]

Connecticut Light and Power Company

The use of DSM as an "arrears avoidance" technique is not limited to utilities that may have high uncollectibles. Consider Connecticut Light and Power (CL&P), a Connecticut subsidiary of Northeast Utilities (NU), for example, a utility that has a bad debt ratio of less than one percent (0.67%). In NU's December 1991 evaluation of the CL&P low-income DSM program, the utility found:

> Overall, the data indicated an improvement in the average *monthly* change in arrearage of $9.73 for the 1989 participants and $18.77 in 1990.* * *(One plan)[35] was specifically targeted to payment-troubled customers, with the express purpose of reducing arrearages.* * *(This plan) was highly successful in this regard. The average (monthly) improvement in arrearages among plan E4 participants was approximately $40.00 for 1989 and $28.00 for 1990.[36]

\[32\] *Id.*, at 2.
\[33\] *Id.*, at 6.
\[34\] *Id.*
\[35\] This plan was called Plan E4.
\[36\] ICF Resources (1991). ***Program Evaluation: Weatherization Residential Assistance Partnership (WRAP) Program: Volume I, Final Report***, Northeast Utilities: Berlin, CT.

The Northeast Utilities effort, begun in 1989 in conjunction with other interested parties in Connecticut, implemented a pilot weatherization program directed at low-income payment-troubled customers.[37] The program, called Plan E4, provided for a maximum investment in energy efficiency of $1500. Participants must have annual income at or below 200 percent of the Federal Poverty Level and the customer's account must be "seriously delinquent." An account having $200 or more in arrears qualified.

Niagara Mohawk Power Company

In a different program, participants in an energy education program offered by Niagara Mohawk Power Company in conjunction with its company-financed weatherization program improved their payment patterns in two ways, according to Niagara Mohawk's evaluation.[38] "First," the utility's report said, "through the affordable payment plan --which guaranteed that their utilities would not be shut off as long as they made a mutually agreed-upon payment amount-- they increased the frequency of their monthly utility payments to almost 100 percent. In contrast, Groups 1 and 2 participants made their monthly utility payments about 50 percent of the time."[39] Second, although the monthly payment amount was as low as $10 per month for participants with very low incomes (and as high as $190), Education participants "increased the average amount of total dollars paid to the utility over the pre-treatment period."[40]

According to the company's evaluation, while all low-income households incurred new arrears, those who had received the weatherization services had fewer new arrears than those who did not.[41] Moreover, the company found, the new arrears for the weatherized households likely arose because the provision of weatherization services was matched with a decrease in fuel assistance. "If those [fuel assistance] dollars had been received at the previous level, it is probable that [the weatherized] households would on average *not* have built up new arrears."[42]

Commonwealth Electric Company

Similar results can be obtained for electric companies. One *electric* company in Massachusetts, for example, has considered an arrears control program using conservation as the mechanism. COM/Electric found that "from the analysis, a Bad Debt Program appears to be not only theoretically sound, but also empirically supported for electrically heated homes and for homes having electric water heaters. It also appears beneficial to offer the program to `other' homes in the Commonwealth service territory."[43] According to SRC, "the main source of economic value to COM/Electric is the reduced carrying costs for late payments."[44]

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[37] Other programs were implemented at the same time directed toward other populations.
[38] Harrigan, M. (1992). ***Evaluating the Benefits of Comprehensive Energy Management for Low-Income, Payment-Troubled Customers*** Alliance to Save Energy: Washington D.C.
[39] *Id.*, at 2, 47 - 61.
[40] *Id.*
[41] *Id.*
[42] *Id.* (emphasis added).
[43] Synergic Resources Corporation (1988). ***Evaluation of the Cost-Effectiveness of a Bad Debt Conservation Program: Final Report***, Northeast Utilities Co.: Berlin, CT.
[44] SRC did not study collection costs.

> SRC found for COM/Electric that the Bad Debt Conservation program had, from a system perspective (*i.e.*, based upon system "avoided cost" savings), a benefit-cost ratio of 1.857 (for electrically heated homes), of 2.290 (for homes with electric hot water but not electric heat), and 1.944 (for all "other" --non-electric heat, non-electric hot water-- homes) of pre-treatment consumption.
>
> The resulting average reduction in annual billed costs is $50 per household. Total contractor program costs averaged $90 per participants in this sample, for a simple payback of 22 months. Average water heating energy savings are estimated at 4.3 mmBtu, yielding additional possible savings of $60 for gas or $150 for electric.

Detroit Edison

In early 1991, the Detroit Edison Company began a concerted marketing and energy management effort to improve the payment practices of the company's low-income customers.[45] The company decided to concentrate attention on addressing issues involving, among other things, the effect of usage reductions on payment behavior. The company had identified high electric use and high arrearages amongst low-income customers as a substantial problem for the utility.

> While these problems were by no means new, the unfolding of the Michigan state budget process made action to address them particularly urgent. In the proposed budget, income support grants to families who received Aid to Families with Dependent Children (AFDC) were to be decreased, as were categorical grants (CAP payments) available to AFDC recipients to pay electric bills.[46]

The need for the corrective action by Detroit Edison was made apparent by internal company analyses showing that "positive billing customers," which involved most of the company's AFDC customers, represented roughly three percent of all residential customers, but accounted for 29 percent of all residential arrears over 30 days old.[47]

Detroit Edison responded by offering an extensive energy management program --called Energy Options-- directed toward these high use, high arrears, customers. As part of the program, Detroit Edison said:

> Energy Options participants received reports with each bill, comparing usage for the month with usage for the same month a year ago. Furthermore, outstanding arrearages were reduced by $0.10 for each kWh of usage reduction(;) the reduction was doubled if the customer paid his or her bill on time.[48]

\[45\] Rosenberg, M. and Feblowitz, J. (1993), "The Detroit Edison Low-Income Customer Service Program: Evaluation in Action," ***Proceedings of the 1993 Energy Program Evaluation Conference***, at 764, Energy Program Evaluation Conference: Chicago.
\[46\] *Id.*, at 764.
\[47\] *Id.*
\[48\] *Id.*, at 766 - 767.

Detroit Edison's evaluation found significant problems with data collection as to payment and collection histories. According to their evaluators:

> Most of the analyses of the effects of energy efficiency programs on customers' payment patterns have run into the same kinds of data problems we experienced. In our case, the published experience of other investigators enabled us to anticipate what some of those problems might be, but we ran afoul of them nonetheless. For example, we dutifully examined the record layout for the Shop File and conferred with Detroit Edison's analysts on the availability of payment information. All of us thought that we had identified fields that contained historical payment records, but it turned out these fields recorded something else entirely. Moreover, due to the sheer volume of transaction details recorded for each customer, the [data processing system] holds only a few months of historical information. We gather the situation is similar at other utilities.[49]

Despite these data problems, Detroit Edison concluded that on average, program participants reduced the amount of their account balance by $150 over the period from July 7, 1992 to December 12, 1992.[50] Moreover, the evaluators found, "concentrating on high-use households will maximize energy savings and cost-effectiveness. Given the demonstrated relationship between high bills and payment problems, targeting high-use customers will also pay off in terms of reduced financial stress."[51]

Pennsylvania's Low-Income Usage Reduction Program (LIURP)

The Pennsylvania Low-Income Usage Reduction Program (LIURP) has been discussed throughout the narrative and appendices of these comments. The program, implemented by each of Pennsylvania's large natural gas and electric utilities, is designed to generate cost effective energy reduction for income-eligible customers. The program is designed, further, to be targeted in a way to wield low-income usage reduction as a tool in helping to address payment troubles.

Pennsylvania's low-income energy efficiency programs, in other words, are specifically targeted so as to generate substantial non-energy savings to utilities. These non-energy savings include reductions in working capital expense, uncollectible accounts, credit and collection expenses, and the like. The results of the LIURP efforts in helping to reduce low-income arrears are presented in Table B-1. This Table shows LIURP results for all Pennsylvania utilities. Table B-1 presents pre-treatment and post-treatment payment patterns for the low-income households to whom energy efficiency was delivered. A payment of less than 100 percent means that the low-income household was not even paying the current month's utility bill. In contrast, a payment *exceeding* 100 percent means that the low-income household was not only paying the current bill, but was paying off its arrears as well.

[49] *Id.*, at 769 - 770.
[50] *Id.*, at 769.
[51] *Id.*

As Table B-1 shows, for every Pennsylvania utility but one, the delivery of energy efficiency substantially improves the payment patterns of the treated low-income households. Indeed, the general impact of the delivery of energy efficiency was a *substantial* increase in the payment coverage of the household energy bill. In most cases the low-income household moved from a situation where that customer was falling further and further behind by failing to pay the current bill to a situation where the household was paying the entire current bill and beginning to retire the arrears.

Table B-1: Bill Payment Impact for Customers with Arrearages: LIURP: Pennsylvania					
1992 LIURP	Heating Jobs		Water Heating Jobs		Baseload Jobs
	Percent of Bill Paid Pre-Period	Percent of Bill Paid Post-Period	Percent of Bill Paid Pre-Period	Percent of Bill Paid Post-Period	Percent of Bill Paid Pre-Period
Duquesne	Not Applicable		91%	100%	78%
Met Ed	78%	107%	79%	107%	
Pennelec	92%	95%	96%	99%	
Penn Power	Not Applicable		95%	93%	
PP&L	51%	95%	55%	105%	
PECO Electric	74%	118%	78%	109%	
UGI Electric	95%	105%	Not Applicable		
West Penn	126%	102%	129%	106%	
Columbia Gas	69%	133%			
Equitable	Not Applicable				
NFG	96%	125%			
PECO Gas	68%	133%			
PG&W	96%	106%			
Peoples	99%	106%			
T.W. Phillips	Not Available				
UGI Gas	89%	115%			
SOURCE: Pennsylvania PUC Evaluation of 1992 LIURP Program Results (1995).					

Appendix C
Low-Income Portion of TAPS Participants and Spending

From: Patricia Squires
To: Juli Abouchar
Cc: Michael Brophy; Norm Ryckman; Susan Clinesmith
Subject: information request

Juli,

As requested, I have prepared a file which contains our Low Income TAPS program as a percent of total DSM budget and as a percent of total EGD distribution revenue. I have also included participant numbers for 2005 and 2006. Please note that this analysis represents low income program spending in one program only, in the residential mass markets.

In the Multi-Res market, where Susan Clinesmith's group has been working closely with the Social Housing Development Corp for some time to develop initiatives to cover the social housing sector, there is no single budget line item where we capture our spending in this area, and therefore we haven't been able to factor this sector into the attached analysis. There have been significant staff time and overhead resources directed at this sector, however, and therefore it should be recognized that the "percent of DSM Budget" and "percent of Distribution Revenue" in the attached file is understated.

Please call if you would like further clarification, or any additional information.

Patricia Squires
Manager
Mass Markets and New Construction Market Development
Enbridge Gas Distribution
Tel: 416-753-6284
Fax: 416-495-8350

From: Patricia Squires
To: Juli Abouchar
Cc: Michael Brophy; Norm Ryckman; Susan Clinesmith
Subject: Re: Information Request LIEN

Juli,

We identify low-income TAPS participants by postal code and we are invoiced separately by our delivery agents for these households, because these homes receive a programmable thermostat in addition to the normal TAPS package. Therefore we are able to track the participants and incentive costs very accurately for these particular households. So, in answer to your question, yes, these figures represent the low-income portion of our total TAPS participants and spending.

In addition to the incentive costs, the spending figures I gave you include "education" costs which cover our energy forums, which are energy information workshops held in low-income municipalities, typically at the request of municipal councillors representing those communities. These forums provide low-income consumers with information and advice on how to save money on their energy bills.

I've attached an updated spreadsheet with the total revenue figures included.

Please call if you have any further questions.

Patricia Squires
Manager
Mass Markets and New Construction Market Development
Enbridge Gas Distribution
Tel: 416-753-6284
Fax: 416-495-8350

"Juli Abouchar" <jabouchar@willmsshier.com>

05/31/2006 05:21 PM

To
"Patricia Squires" <Patricia.Squires@enbridge.com>

cc

Subject
Information Request LIEN

Patricia,
Could you please clarify for me how you calculated the spending and participants identified for the "low-income TAPS" program.

Do these numbers represent a portion of the spending in the TAPS program that is delivered to low-income homes? And a portion of the participants in the TAPS program who are from low-income homes?

Or do they represent funding on, and participants in, all TAPS delivered homes?

I would also be grateful to receive the figure that I asked for earlier today of spending on low-income DSM as a % of total revenue including commodity costs.

Thanks in advance for this information

Juli

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Appendix C: Low-Income Portion of TAPS Participants and Spending

TABLE C-1

Enbridge Gas Distribution
Information Request from LIEN
Provided by email, May 30, 2006 Updated and re-sent June 1, 2006
Source: Patricia Squires

Spending on Low Income TAPS Program (includes program costs, incentives, and information/education components)

2005	actual	$406,950	(represents approximately 3 months of program delivery - program launched in October, 2005)
2006	budget	$483,750	(program for 2006 being launched in May, no actual results for 2006 yet)

Participants in Low Income TAPS Program

2005	actual	2,356
2006	budget	2,500

DSM Total Budget (reference: response to undertaking JT1.4 from Schools)

2005	budget	$15,333,855
2006	budget	$18,913,711

Low Income TAPS as a percent of DSM total budget

2005	2.7%
2006	2.6%

Enbridge Gas Distribution Revenue (reference: response to undertaking JT1.4 from Schools)

2005	budget	$908,400,000
2006	budget	$950,000,000

Appendix C: Low-Income Portion of TAPS Participants and Spending

Low Income TAPS as a percent of EGD Distribution Revenue (i.e. commodity costs removed)

2005	0.04%
2006	0.05%

Enbridge Gas Total Revenue (includes distribution, load balancing and commodity related revenue for all rate classes)

2005	budget	$2,889,964,155
2006	budget	$3,721,348,366

Low Income TAPS as a percent of EGD Total Revenue (includes distribution, load balancing and commodity related revenue for all rate classes)

2005	0.014%
2006	0.013%

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