THE LOW INCOME WEATHERIZATION PROGRAM:

TOWARD ESTABLISHING PROGRAM OBJECTIVES TEN YEARS LATER

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ABSTRACT

Federal and state governments have funded programs to weatherize the homes of low income people since the middle 70's, primarily through the federal Weatherization Assistance Program. Minnesota has invested some $30 million of its own appropriations combined with approximately $68 million in federal funds to weatherize almost 100,000 residences around the state.

One apparent--but extremely critical--deficiency has been the lack of clearly established objectives for the program. Is the Weatherization Program's goal to reduce the fuel bills for low income people and if so, to what degree? Is it to eliminate or at least significantly reduce reliance on fuel assistance? Is it to invest public funds to a point of positive net present value? Or is it to achieve some common standard of efficiency for all buildings that are improved? Is it to improve as many residences as possible at a more limited level so at least some benefits accrue to all low income households? Or should the focus be on fewer homes improved to ensure greater quality? Or is Federal Weatherization a jobs training program for providing disadvantaged individuals with skills that are marketable?

This paper begins a discussion of these fundamental questions that lead to very different outcomes in the way the program is administered and in the results that are achieved. After reviewing other studies that propose objectives for the Weatherization Program, another alternative is suggested which takes into account the future reliance of the household on Energy Assistance.

This alternative policy indicates that a substantially larger investment, almost 7 times the current level, could be justified in order to obviate the need for any future Energy Assistance payments. Under this scenario, up to $11,600 could be cost effectively invested in Weatherization if significant energy savings--exceeding 50-60%--were achievable.

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INTRODUCTION

The federal government has spent over $2.5 billion dollars in the last ten years weatherizing the homes of approximately 1.4 million low income residents.[1] In Minnesota, almost 100,000 residences have been weatherized with those federal funds and an additional $30 million appropriated by the legislature.[2]

The program has experienced--like other energy programs--dramatic shifts in funding levels, changes in administrative oversight, and modifications in program implementation requirements. One deficiency has been the lack of clearly established goals and objectives for the program. Although the Weatherization Program is intended to assist low income households by making their residences more energy efficient, there is little documentation on what that goal means as the program is implemented.

The Weatherization Program has been variously described as a jobs training program, as a means to reduce energy bills of the low income, as a means to reduce reliance on the Low Income Energy Assistance Program, and as a mechanism to improve the nation's housing stock. While these descriptions are not necessarily mutually exclusive, nor are they undesirable, they lead to different outcomes. The lack of a clear statement of objectives therefore leads to limited program benefits and successes.

Several studies have been written which treat parts of this issue. The Consumer Energy Council of America (CECA) conducted a study in 1981 which proposed that Weatherization Assistance and Energy Assistance be combined to more effectively use scarce federal resources to assist more eligible households.[3] The Department of Energy in 1985 completed a report which proposed the adoption of explicit payback requirements on the installation of energy conservation measures in order to improve the cost effectiveness of the program, and to serve greater numbers of households.[4]

While these reports are an important beginning to a discussion on program objectives, they do not establish definitive directions for states or local delivery agencies implementing the program. This paper reviews these and other studies, and discusses the interaction of the Weatherization and Energy Assistance Programs.

Finally, an Alternative Objective is proposed that recognizes the interrelationship of Energy Assistance and Weatherization Assistance. This Alternative Objective proposes to establish a broader cost effectiveness standard for Weatherization that takes into account future reliance on Energy Assistance payments. Theoretically, investments could be economically justified in each residence up to the point where the net present value of all future Energy Assistance payments reaches zero. In Minnesota, an investment of up to $11,600 could be justified in an average residence, if 61% energy savings could be achieved. There would then be no need for future Energy Assistance payments, and the household would be economically self-sufficient with regard to its energy costs.

PROGRAM BACKGROUND

The Federal Weatherization Program assists low income households by providing grants of approximately $1,500 to be used to make improvements in their homes to reduce energy consumption, and to make them more comfortable for the occupants. The current Weatherization Program is administered by the Department of Energy (DOE). DOE provides grants to states, which in turn contract with local delivery agencies which are typically Community Action Agencies. Those agencies identify eligible households, and then hire contractors to install the energy conservation measures, or install them with their own employees.

Federal funding for the program has varied widely, from a high of $245 million in 1983 to $191 million in 1985.[5] The administration has requested that the program not be federally funded in the future.

DOE provides direction to states in the use of the federal funds through two mechanisms: federal regulations and the requirement for states to file plans describing program plans. The federal regulations establish income and other eligibility criteria for clients, and require states to either follow federal procedures or establish some other means to provide consistent installations of measures in residences.

The State Plans detail implementation procedures such as income verification processes, outreach mechanisms, coordination with the Energy Assistance Program, the assistance levels, and the process for determining which measures will be installed. Those plans are reviewed and approved by DOE on an annual basis.

While DOE requires that only measures that are cost effective be installed, there is no definition of that term. Instead, DOE limits expenditures by establishing a maximum investment of materials in each residence, and setting

an average maximum investment of labor. States are entitled to establish lower maximums if they wish.

PROGRAM APPROACHES

As noted earlier, the Department of Energy has not established explicit objectives for the Weatherization Program. It has established various parameters through the adoption of regulations which dictate eligibility criteria, the requirement that measures installed be cost effective, and establishment of maximum expenditures for each residence. Beyond this level, though, establishment of greater policy direction is by default left to the states. This section briefly describes alternative objectives that states could adopt as they weatherize the residences of low income households.

Technical Efficiency Approach

The current Weatherization Assistance Program generally is operated so that all the energy conservation measures from an approved priority list are installed until the maximum investment per house allowed under federal regulations is reached. Thus, in larger homes, in homes that are older or otherwise need greater numbers of measures, or in unusual homes, it is possible that not all measures generally determined to be cost effective are installed.

In addition, because there are not distinctions made between homes heated with different fuel types (with presumably different costs), homes with lower heating bills have the same level of investments as homes with higher heating bills, where more measures might be cost effective. Finally, there is no distinction at any level between states, or within states, that recognizes different climatic zones. In areas where there are more extreme temperatures, more heating or cooling costs will be experienced by low income residences, which would have the effect of making more measures cost effective. Yet DOE and states have established one investment level for all homes.

One alternative objective that could be adopted would be to establish a technical efficiency standard for each unit weatherized. Under this approach, standards would be established a priori for all units to be weatherized. Although each measure in the protocol would be cost effective, the entire protocol would be applied to each unit to be weatherized, regardless of cost.

While appearing radical, it is actually a policy that is already applied to buildings. Building codes, which include requirements for the energy efficiency of new structures, almost always specify minimum R-values for attics, walls, foundations, and other building components. These requirements are established over large geographic areas with varying climates, fuel types, fuel costs, and differing construction practices. Thus, even though the cost effectiveness of components of the standards may be higher or lower depending on the particular circumstances, there are minimum technical criteria established for all buildings.

Establishment of minimum technical standards could result in significant benefits. First, once the standards were agreed on, policy makers would be able to receive clear reports on the progress being made on weatherizing the residences of the low income population. A major source of confusion (and consternation) of legislators is that it is not clear which homes have been weatherized and which ones have not due to the fluctuating investment levels over the life of the Weatherization Program. In early years of the program, investments were limited to $450, significantly less than the $1,600 permitted now. It should not be surprising that in many "weatherized" homes, there is no wall or foundation insulation, the furnace is not efficient, and many windows do not have storms. A technical efficiency standard would avoid this problem by assuring that all units would be brought up to a common standard.

A second benefit would be that program recipients are assured that their residences would be made as efficient as could be reasonably achieved, regardless of the size, age, or condition of the structures. Although policies would need to be developed to deal with houses nearing the end of their useful life, most units could be expected to be brought up to a common standard.

A third benefit would be reduced administrative costs in delivering the program. Local subgrantees would know that the work crews or private contractors would be installing all measures that were deficient in terms of the technical criteria. Inspections could be limited to determining those deficiencies, and the conservation items that are required to comply with the criteria. There would not need to be a calculation of costs of each measure to determine where the cut-off point is for that particular residence.

Finally, once completed, that unit is "complete," and never needs additional weatherization work. Even if the home is transferred to another low income household (which under current practices is eligible for further weatherization), there would be no need to return since there would be no additional work to perform. (It should be noted that for the purposes of this paper, it is somewhat naively assumed that we know all there is to know about weatherizing homes. The last ten years should provide ample proof that there is significant room for increased understanding of possible retrofits which can make existing housing units more efficient at even more cost effective rates.)

Although the adoption of technical efficiency criteria holds considerable appeal for its administrative ease, it has a major drawback in terms of cost effectiveness. While other policy models rely heavily on the economics of these investments, the technical efficiency model could result in the installation of measures that may not on a case by case basis be cost effective. While there is nothing inherent in the model (the standards could be established at whatever minimum level desired by policy makers), it is more likely that investments in particular cases would be greater in larger, older, or more dilapidated homes.

Social Benefits Approach

A second approach or objective that the Weatherization Program could seek to achieve is to attempt to make the residences of low income recipients energy

efficient enough so that their annual fuel bills as a percentage of income would be comparable to those of the average household. There have been numerous discussions regarding the level of expenditures that households (especially low income households) ought to be expected to be able to afford in heating their residences.

In Minnesota, organizations representing low income residents have proposed "fair share" formulas where low income residents would be expected to pay the same percentage of their income towards utility bills as the average Minnesotan. Generally those proposals have suggested that average low income persons would then pay 3% of their income towards their heating bill, or 5% towards their entire utility bill. Under these scenarios, the remainder of the utility bill which exceeds the average would come from other sources: the federal Energy Assistance program, state appropriations, or from private sources.

For the purposes of this paper, it is assumed that households would be responsible for committing up to 5% of their income towards their utility bills. While the focus and examples provided only examine natural gas consumption in determining that liablity, that fuel comprises the majority of the energy bill for a typical household.

Under the Social Benefits Approach to the Weatherization Program, each eligible applicant would have a calculation completed for their residence. That calculation would include a determination of the level of conservation investments which would be required so that the resulting fuel bill as a percentage of income would not exceed the average percentage of income paid towards the fuel bill for the typical resident.

While this approach represents an intertwining of the issues that confront both the Weatherization Program and the Energy Assistance Program, it recognizes the complexities of dealing with recipients who are linked to both. While the Energy Assistance Program assists low income households with paying their energy bills, it is not structured (nor designed) to be a mechanism to reduce future reliance on that financial assistance. The adoption of an alternative approach to the Weatherization Program which recognizes the reliance (both currently and in the future) on the Energy Assistance Program should cause consideration of a policy which limits, to the extent possible, future dependence on this income transfer program.

The adoption of this type of objective would require a major overhaul of both federal programs. First, because the Energy Assistance Program does not currently provide assistance to limit liability to the 3% or 5% level, such a policy could conceivably entail incredible increases in financial obligations to pay utility bills. Second, the weatherizing of homes to make them energy efficient enough so that the resulting fuel bill would not exceed 3% or 5% of the household's income would require significant modifications in the Weatherization Program's design.

The last evaluation of the Weatherization Program in Minnesota found, for example, that average savings from weatherization was 14.4%.[6] On an average fuel bill of $650, the annual dollar savings from weatherization is therefore

$93. If the income of a two-person household is $7,050, under a fair share concept the maximum fuel bill liability should not exceed $353. Even after the residence is weatherized under current guidelines, the resulting annual fuel bill exceeds the fair share the household should be expected to pay, with an unmet need of $205. The Weatherization Program thus does not obviate long-term reliance on Energy Assistance transfer payments.

Thus, weatherization of residences does not necessarily result in the elimination of the need for fuel assistance. The problem is further compounded in that assistance levels are not (at least in Minnesota) adjusted for the weatherization of Energy Assistance eligible households. Rather, in the development of assistance levels, an evaluation is made of the fuel bills of all recipients of Energy Assistance from the previous year. Although fuel bills, on average, will be affected to some degree due to the weatherization of some percentage of all Energy Assistance eligible households, a particular residence's assistance amount is not directly affected.

For example, a household that receives the average Energy Assistance payment which is the equivalent of 50% of their bill, is then weatherized so that its fuel bill is decreased by 14.4%. The household will, if all other factors remain the same, receive in the next heating season an Energy Assistance payment that is identical to that of the last year. However, instead of being the equivalent to 50% of the household's bill, it will now be a subsidy equivalent to 58% of the bill.

The household would have been required to commit 9.2% of its income toward energy costs if no Energy Assistance were provided. With such Assistance, the household's liability would have been reduced to 4.8%, under the Fair Share concept. With the addition of Weatherization Assistance, energy cost liability would be reduced to 3.5%.

The interrelationship of Weatherization and Energy Assistance is extremely complex. However, Weatherization Assistance investments have not been established in such a way as to minimize future reliance on the Energy Assistance Program as a long term income transfer program.

Economic Efficiency Approach

A third approach that could be adopted as an objective for the Weatherization Program is to establish paramaters based on economic efficiency. Under this objective, a cost effectiveness criterion would be established to determine the level of investments in each residence.

In discussing the goals and objectives of publicly financed assistance programs, it is important to understand the general expectations that such programs are expected to meet. These usually include the accomplishment of objectives from an administrative point of view, and then either its economic benefits or its social benefits. Few programs are expected to pass muster on both social and economic benefits tests.

However, in order to gain the broadest support possible for the Weatherization Program, advocates have billed the Weatherization Program as meeting all three criteria, a "tall order for any program."[7] The previous section discussed Weatherization Program objectives from a social benefits perspective. The more common standard for establishing financial assistance programs such as Weatherization is to require that they meet some type of cost effectiveness criterion.

DOE's regulations will generally result in the installation of measures that are in and of themselves cost effective. However, it is very possible that on a case-by-case basis not all units will be weatherized to the extent that it is cost effective. For example, in larger houses, the maximum expenditure permitted under federal regulations will be reached before all measures that are otherwise cost effective (according to the priority list) are installed. Thus, although the expenditure on the larger units may be similar to that on smaller units, the actual completion of installed measures will be less.

The GAO Study

There has been considerable discussion on the appropriate cost effectiveness test that ought to be applied to the Weatherization Program. Recently, the Government Accounting Office (GAO) completed a study evaluating possible improvements to the ways Weatherization Program funds are spent.[8] That report, issued in October, 1985 found that:

* At current rates of weatherizing homes, it will take between 15 and 100 years to complete all eligible homes;

* Recent legislation permitting Energy Assistance eligible households to also be eligible for the Weatherization Program will have the effect of increasing the remaining eligible population by over 50%;

* Legislation was adopted which permits an average federal maximum of $1,600 to be followed, rather than an absolute maximum expenditure;

*Recognition that units weatherized in early years of the program may need to be reweatherized due to the limited useful life of the measures.

With these findings, the Government Accounting Office recommended that DOE consider adopting a payback criteria which would ensure that the limited federal dollars be spent in the most cost effective manner possible.[9]

Unfortunately, although the GAO was correct in concluding that it is important that DOE evaluate the appropriate objectives for the Weatherization Program, it inappropriately directed DOE's attention to the Residential Conservation Service Program (RCS) as a useful source for finding guidance for setting new objectives. The RCS Program is also a federal energy conservation program, one in which major gas and electric utilities offer energy audits to their smaller residential customers. The goal of the RCS Program is to provide information

and education to reduce barriers for people deciding what kinds of energy conservation investments are appropriate for their own residences.

In 1981, DOE proposed major modifications to the regulations implementing the RCS Program. One component of that rule change was to limit to seven years the payback on measures which were required to be included in the energy audit of the residence. DOE had conducted an analysis which it believed indicated that homeowners were generally not interested in making investments which exceeded 7- year simple paybacks.

There are at least two drawbacks to this part of the GAO analysis. First, it seems to be a prima facie deficiency to apply logic for an education/information program used primarily for moderate and upper income homeowners to a financing program designed solely for low income households. DOE, in modifying its regulations for the RCS Program, sought to limit the scope of the energy audit to those measures which would be of greatest interest or immediate economic benefit to program participants. (It is also understood that DOE sought to limit the scope of the audit so that utility costs to implement the program would be reduced.) A summary recommendation to limit the direct investment in the homes of low income people to that of an information program standard therefore seems wholly inappropriate.

The second drawback parallels one discussed earlier. While it is appropriate for DOE and the GAO to design and implement the Weatherization Program so that it is cost effective, there should be a more in-depth review of what the program's goal should be. Has DOE evaluated the long-term implications of a 7 year payback requirement for the Energy Assistance Program?

To achieve a 7-year payback requirement at the current level of per unit expenditures for the Weatherization Program, the GAO estimates that there would need to be at least a 25% reduction in the fuel bill.[10] Although Minnesota's Weatherization Program has undoubtedly improved since the 1983 study which found a 14.4% savings, it is quite possible that the level of investment in each unit would be reduced under the GAO proposal.

If, for example, Weatherization investments were limited to the point where only a 16% savings were achieved, the average fuel bill savings would amount to $104 on an annual bill of $650. That household (with an income of $7,050) would be eligible for Energy Assistance of $340, for as many years as they were eligible for the program. If, however, measures were installed to some other level, it is at least conceivable to limit fuel bills to the point where they would not exceed a fair share of the household's income. In this example, if fuel bills were reduced to $352 (a 45% reduction), the household would require no future energy assistance.

While 45% savings are at the high end of what is achievable, improvements in technology do provide the opportunity to make larger investments which substantially reduce bills. While the individual investments, or even the package of measures, may not be in and of themselves cost effective if defined by a seven-year payback, when coupled with consideration of long-term reliance on future Energy Assistance payments, they may be a better long-term strategy for the program.

The CECA Study

The 1981 study by the Consumer Energy Council of America (CECA)[11] appropriately evaluates the complex interrelationship between the Energy Assistance and the Weatherization Programs. The low income recipient, if served by both programs, is economically indifferent if Energy Assistance reduces utility bills, or if Weatherization reduces consumption and lowers the utility bill.

CECA points out that both Weatherization and Energy Assistance present a drain on the U.S. Treasury. From its perspective, it is indifferent if the expenditures are for Energy Assistance or Weatherization. However, from a national perspective, Weatherization results in reduced consumption of fossil fuels and lessened reliance on foreign oil imports.[12]

As CECA so aptly noted, "Since neither the low income beneficiary nor the Treasury would be hurt by using energy assistance funds for weatherization, and since the nation would benefit in the process, the logical conclusion would be to shift energy assistance resources to weatherization."[13]

To accomplish this transfer of effort from Energy Assistance to Weatherization Assistance, CECA proposed a multi-staged approach that would minimize reduced benefits through the Energy Assistance Program. CECA's proposal would result in blanketing all eligible low income households with a low investment/high payback package of energy conservation measures. The large savings resulting from the installation of these measures could be plowed into the installation of two additional levels of conservation investment packages. No household under the CECA scenarios would receive less that 78% of its original Energy Assistance entitlement, and by the third year the stream of benefits would be equal to the status quo ante.

AN ALTERNATIVE PROPOSAL

The GAO and CECA studies present a full range of alternatives for policy makers as they consider the future of the Weatherization and Energy Assistance Programs. The GAO recommendation for a strict simple payback standard for all measures is one method to apportion limited resources in an efficient way. The CECA recommendation to use a portion of the Energy Assistance Program to generate additional energy bill reductions through conservation represents the other end of the continuum.

Although undeniably more holistic in nature, the CECA proposal entails signficant implementation and distributional challenges. As the authors acknowledged, administrative questions such as the cost effectiveness of returning to each Weatherization-eligible residence three times to install the packages remains to be evaluated. The full impact of a 22% reduction in Energy Assistance benefits, even in the short run, also has major implications for low income households who occasionally pay in excess of 50% of their income towards utility bills.

If these two studies represent the range of opportunities for those implementing these two major energy programs, perhaps there is an alternative approach which would at least consider the interrelationship between the two. The CECA concept of incorporating the total federal expenditures into the attempt to reduce national reliance on fossil and imported fuels ought to be combined with the GAO concept of a cost effectiveness standard for Weatherization Assistance.

However, until now, there has not been an attempt to establish a cost effectiveness standard for Weatherization Assistance that takes into account future reliance on Energy Assistance. CECA instead leapfrogs this issue and proposes to reduce Energy Assistance benefits to assist greater numbers of households, but without making each household's energy bill so affordable that there would be no future reliance on federal assistance. An alternative proposal would entail a determination of what would be cost effective for a package of energy conservation measures, taking into account the reliance (or lack of it) on future Energy Assistance payments.

As noted in the discussion of the Social Benefits approach, it is theoretically conceivable that residences could be weatherized to the point where the energy bills would be so low as to be affordable by even the lowest income household. While it is unlikely that the installation of such a package of measures would be cost effective from a simple payback perspective, when considered from the perspective of a continuing long term reliance on transfer payments, greater per-household expenditures become cost effective.

Thus, even though the CECA proposal to use Energy Assistance payments to weatherize more households makes good economic sense, policy makers should consider making greater per household expenditures which recognize the avoidance of long term income transfer liabilities.

Example

Consider the characteristics of the following household:

Annual income	$7,050
Annual gas bill	$921
Annual gas consumption	160 mcf[14]
Heating degree days	8,159

Under current Energy Assistance Program guidelines, this two-person household would be eligible for $310 assistance. The remaining bill, $611, represents 8.6% of the household's income, and exceeds the fair share concept of 5%.

If this residence were to be made more energy efficient under the federal Weatherization Assistance Program, its fuel bill would be reduced. If the full package of measures were installed under that program so that $1,650 were invested, approximately 20% savings would result.[15] If an analysis of that investment assumed the following:

Cost of investment	$1,650
Cost of fuel	$5.76/MMBTU
Energy savings	32 mcf
Discount rate	7%
General inflation rate	3%
Energy inflation rate	7.7%

These findings would result:[16]

Simple payback	9 years
True payback	10.4 years
Net present value	$1657

This household's energy bill would now be reduced by the 20% savings from Weatherization, and would be $737. If the Energy Assistance levels were not modified, the household would be eligible in the second year for a transfer payment of $310. The remaining liability for the household would be $427, or 6% of their annual income.

This example of the effects of the current programs demonstrates two issues: 1) Despite Weatherization Assistance, the household will need to continue to rely indefinitely on Energy Assistance to make its energy bills more affordable; and 2) The effect of both programs is insufficient to reduce energy bill liability for this low income household so that it is comparable to that of an average household.

One option policy makers could consider is to take into account the future stream of costs (benefits for the household) in determining the amount of the Weatherization Assistance levels. In other words, what is the net present value of the total payments the household would otherwise receive under Energy Assistance that if invested in energy conservation now, would obviate the need for any assistance at all?

If we were to assume that the household had the same characteristics as previously presented, and it were determined that the household could be able to afford to spend 5% of its income towards energy bills, energy consumption would have to be reduced by:

Income X affordable percent towards energy = affordable bill

$7,050 X 5% = $350

Affordable bill/cost of fuel = # of affordable units of fuel

$350/$5.76/mcf gas = 61 mcf of gas affordable

Thus, policymakers would need to determine how to use their financial assistance to pay for the equivalent of 160 mcf (actual consumption) - 61 mcf (affordable consumption) = 99 mcf or 99 mmBTU (unaffordable consumption).

Using the same cost benefit analysis model that was used to project the simple paybacks and net present value of current weatherization investments, it

is possible to calculate the net present value of long term Energy Assistance payments for this residence. Assuming there was no investment in conservation measures and an energy consumption reliance of 99 mmBTU, the net present value of Energy Assistance payments is $11,694.

Therefore, from the economic perspective of the federal government, any investment up to $11,694 which would save the 99 mmBTU would be economically sound. If the equivalent savings of 61% could be achieved for any expenditure less than that investment, the federal treasury would be even better off.

The challenge then is to determine if it is technically feasible to invest in Weatherization Assistance to the point of achieving 99 mmBTU savings for this household.

CONCLUSION

The discussion on investment levels for the Weatherization Program has in the past been generally limited to simple paybacks considering that investment alone. Ignored thus far is what effect, if any, Weatherization Assistance has on future reliance on Energy Assistance.

If Weatherization Program assistance levels were determined in such a way as to make future fuel bills affordable, without reliance on Energy Assistance, much higher investment levels can be supported. In the example above, a Weatherization Program investment of up to $11,600 could be justified if a 61% energy savings would result.

It is not suggested that Weatherization Program guidelines be immediately modified to permit such an incredible increase in per unit expenditures. However, the analysis does imply that the discussion of Weatherization Program objectives and expenditures has to a certain extent missed the point.

Instead of debating whether expenditures should be set at $1,450, $1,650 or some average expenditure, the discussion ought to be focused on greater investments and research that would lead to a better understanding of reducing fuel bills so that households can be made self-sufficient. Most importantly, the federal government would be economically better off, since it would eventually be free of an indefinite liability to appropriate funds for income transfer payments through the Energy Assistance Program.

It may very well be that it is technically impossible to consistently achieve energy savings approaching 60% as a result of weatherization. At a minimum though, the debate could be re-targeted to a discussion on how to achieve much greater savings than existing research has shown is achievable.

For example, the National Bureau of Standards completed a research project in 1982 which attempted to optimize weatherization. That project resulted in average savings of 41% with an average expenditure of $1,862.[17] The Minnesota Department of Energy and Economic Development is currently engaged in an "Optimal Weatherization" research project in an attempt to assist program

deliverers maximize energy savings.[18] That project also holds promise of the potential of significantly greater energy savings than what is currently achieved.

The benefit of this methodology is that it considers the broader perspective of the streams of benefits and costs for both the Energy Assistance and Weatherization Assistance Programs. Technical staff, economic analysts, and policymakers ought to expand their consideration of assistance levels with this broader perspective in mind.

The example used above indicates that it is theoretically conceivable to invest seven times the current level in conservation and still be cost effective. Further research and analysis is needed to determine if those investments are technologically feasible, and then if they are achievable in practice.

DOE and States ought to engage in demonstration projects that would evaluate alternative strategies and program approaches that promise greater energy cost savings. Those demonstration projects would need to be large enough to result in statistically significant conclusions that would permit policy makers to consider such dramatic changes to the program guidelines.

The Federal Weatherization Program has now been in existence for over ten years. With the completion of numerous high quality evaluations of late, the challenge for this program's adminstrators is to re-evaluate its objectives to ensure that it is implemented to the maximum benefit possible. This author suggests that radically larger investments in conservation retrofits in eligible dwellings is economically justified, if there is a commitment to reduce future reliance on energy assistance payments.

FOOTNOTES

[1]"Low Income Weatherization--Better Way of Meeting Needs in View of Limited Funds," U.S. General Accounting Office,October 31,1985. GAO/RCED-86-19. pp. i-ii.

[2]"Energy Assistance and Weatherization," Program Evaluation Division, Office of the Legislative Auditor, State of Minnesota, January, 1985. pp. 71-77.

[3]"A Comprehensive Analysis of the Costs and Benefits of Low Income Weatherization and its Potential Relationship to Low Income Energy Assistance," Consumer Energy Council of America, Research Foundation, June 2, 1981.

[4]GAO Study, op.cit. pp.29-30.

[5]Minnesota Office of the Legislative Auditor, op.cit. p.77.

[6]"A Study of the Effectiveness of the Weatherization Program in Minnesota," Bakke Kopp Ballou and McFarlin, Inc., Consulting Engineers, January 10, 1983. p. 7.

[7]CECA Study, op.cit. p.5.

[8]GAO Study, op.cit. p.9.

[9]GAO Study, op.cit. pp.29-30.

[10]Ibid. p.34.

[11]CECA Study, op.cit.

[12]Ibid. p.61.

[13]Ibid.

[14]"The Cost Effectiveness of the Minnesota Weatherization Program," Abigail McKenzie and Steve Pheneger, Policy Analysis Division of the Minnesota Department of Energy and Economic Development, July 1983. p.2.

[15]"Energy Savings Achieved by RAP Weatherization," Patrick Mulloy, Energy Technology Associates, August 1985. Executive Summary, p.1. It should be noted that the 20% savings estimate is also the percentage savings estimated in the Weatherization State Plan submitted to DOE.

[16]The calculations of these values were completed using an economic analysis model developed by Jess Dumagen, Staff Economist of the Policy Analysis Division of the Minnesota Department of Energy and Economic Development. The model, which operates on an IBM-PC-AT, uses a Lotus spreadsheet to account for varying fuel escalation rates over time.

[17]"Optimal Weatherization of Low-Income Housing in the U.S.: A Research Demonstration Project," Richard Crenshaw and Roy E. Clark, U.S. Department of Commerce, National Bureau of Standards, September 1982. p.1.

[18]The Energy Division of the Minnesota Department of Energy and Economic Development has contracted with the Underground Space Center of the University of Minnesota to conduct a two year study of methods to improve the cost effectiveness of the Weatherization Program in Minnesota. The first written report is due in the summer of 1986.