

ALASKA 1998 REACH PROGRAM

FINAL EVALUATION

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EXECUTIVE SUMMARY

1998 ALASKA REACH PROGRAM

Program Description & Goals

The Alaska Residential Energy Assistance Challenge (REACH) program, is a research and demonstration program funded by the Office of Community Services in the Administration of Children and Families of the U.S, Department of Health and Human Services. REACH provides a variety of services and benefits to clients who are recipients of a Low-Income Home Energy Assistance Program (LIHEAP). The programs are state-specific and offer a wide range of innovative approaches to low income home energy issues. The primary goal of the REACH program as stated by the Office of Community Services is to “demonstrate the long term effectiveness of supplementing energy assistance payments with non-monetary benefits that can increase the ability of eligible households to meet energy costs and help them achieve energy self sufficiency”.

REACH grants are made to state offices that administer the LIHEAP program. These offices are required to carry out their programs through community based organizations.

In Alaska Rural Alaska Community Action Program, Inc implemented the REACH program. (RurAL CAP), and the REACH program was named the Energy Conservation Initiative (ECI). ECI was a collaboration between RurAL CAP's RAVEN AmeriCorps Program and the REACH program. The project was intended to decrease dependency on public assistance by measurably reducing the energy costs of 2,250 low-income households. The ECI project was designed with input from low-income people across the state along with technical know-how from Alaska's home energy conservation and weatherization fields.

Evaluation Goals

The evaluation method initially proposed was to “measure the program activities efficacy in achieving stated goals related to reducing participant home energy costs and increasing the ability of participants to meet such costs independent of payment subsidy.”

The proposal indicated that for outcome evaluation the data collection tools would be internal CBO records and the external data collection methods would consist of :

1. Client questionnaires – requesting information on fuel consumption costs from LIHEAP recipients who received service from AmeriCorps Members;
2. Community store surveys – requesting information from stores in AmeriCorps member communities regarding baseline data on their stocking of energy efficient products;
3. Site Visits to 20% of the communities chosen randomly – site visits include interviews with program recipients, AmeriCorps members and other community members. Some trips would be timed to coincide with scheduled energy fairs.

The Logic Model and Evaluation Plan developed after the program was funded, recognized that the survey questions on fuel use could be helpful, but would not be weather averaged nor account for price fluctuations. The evaluators' experience in rural Alaskan communities gave insights into the problems with record keeping, the culturally inherent approach to sharing (which includes fuel oil),and also helped identify that a single group study was the only approach possible as a properly formed control group is not possible in such small isolated communities.

Therefore, the decision was made to include the AKWarm energy modeling software as a CBO data collection tool in order to gain empirical data before and after service impact. In conjunction with these results, pre- and post- blower door testing would give accurate and measurable data to evaluate the energy saving benefits from REACH activities.

As is often the case in program implementation, the completion of required tasks becomes the overriding goal and data collection takes a back seat to implementation. This program was no exception. Numerous AKWarm files were submitted blank or containing incomplete data. None of the higher level investments of building materials were tied to AKWarm files. Pre- and post-blower door testing was very limited, and while the important pre- air sealing testing was performed on 90% of the homes receiving energy conservation products and incentives, thus preventing under-ventilation and other building problems associated with undisciplined energy conservation activities, it did little to provide a robust database from which to capture all the benefits of the activities.

The conclusions and finding in this report are therefore based on very weak and limited data and the savings estimates are derived from additional information obtained by the evaluator in conjunction with other cited studies. In every case the analysis has been conservative, based on the lesser values obtained from the available data.

Key Findings

I. Immediate Outcomes

- 1.) 1604 households received some services.
- 2.) 1437 received direct household visits with client education and blower door testing
- 3.) 4,146 compact light bulbs were distributed
- 4.) 140 households received high level services which included
 - i. 23 refrigerator replacements
 - ii. 39 high efficiency heater replacements
 - iii. 6 electric water heater to on demand oil
 - iv. 72 received repair and conservation materials

II. Intermediate Outcomes

- 1.) Measurable Energy Savings were minimal for the majority of program recipients.
- 2.) Bill Reductions were not recorded by program and not available elsewhere
- 3.) Measurable Energy Burden Reductions were noticed by 48% of the 140 households receiving high level services
- 4.) 1437 received direct household visits with client education and blower door testing
CBR (cost to benefit ratio) of 1.15
- 5.) 4,146 Compact Fluorescent Light Bulbs (CBR 3.55)
- 6.) 140 households received high level services which included
 - i. 23 refrigerator replacements (CBR 10.23)
 - ii. 39 high efficiency heater replacements (CBR 1.45)
 - iii. 6 electric water heater to on demand oil (CBR 9.8)
 - iv. 72 received repair and conservation materials, no CBR available

Final Results

Summary of Final Results 1998 Alaska REACH program	
<i>Reach Priority Areas</i>	How Program Addressed Priority
<i>A. Purposes of REACH program</i>	
Minimize health and safety risks that result from high energy burdens on low-income Americans	Provided air tightness tests for 1,437 homes in an attempt to insure that the program did not under-ventilate the homes with activities, and create moisture problems that would lead to building structure degradation. Installed Carbon Monoxide detectors in REACH households. Educated REACH recipients in ventilation and indoor air quality matters
Prevent Homelessness as a result of inability to pay energy bills	Was not an activity this REACH program addressed
Increase efficiency of energy use by low-income families	Air Sealing Appliance and lighting efficiency improvements Heating system efficiency improvements REACH recipient in home education with air tightness testing Water heater efficiency improvements
Target energy assistance to individuals who are most in need	Energy use and energy burden used in selecting households to receive high level of services
<i>B. REACH State Performance Goals</i>	
A reduction in the energy costs of participating households over one or more fiscal years	ECI program incentives Air Sealing Appliance and lighting efficiency improvements Heating system efficiency improvements REACH recipient in home education with air tightness testing Water heater efficiency improvements
An increase in the regularity of home energy bill payments by eligible households	Was not an activity this REACH program measured
An increase in energy vendor contributions towards reducing energy burdens of eligible households	Was not an activity this REACH program addressed
C. Other State articulated Performance Goals	
No additional Performance goals were articulated in the State REACH funding application	

Conclusions and Recommendations

The REACH program announcement stated that an objective of every State REACH project should be to measure whether its activities are more cost-effective in the long term than energy assistance payments alone. Since the majority of the Non Energy Benefits that can be attributed to REACH may also be attributed to energy assistance payments alone, the actual reduction in energy use for REACH recipients, no matter how small, would indicate that REACH activities were more cost effective than just providing assistance. This cannot be construed to mean that REACH would be an acceptable substitute for energy assistance payments, and it is quite clear that without the energy assistance payments many REACH recipients would not be in a position to receive REACH services as they would be forced to relocate to another dwelling or community.

According to a GAO report on REACH, three other performance goals / questions were posed in legislation authorizing the REACH program as follows:

Does the REACH program;

1. Reduce energy costs of participating households? Clearly the energy burden was reduced modestly for the majority of participating households, significantly for the 10% who received the higher level of service (see tables and energy savings below). There was, however an 18% increase in the cost of home heating oil during the program period (US DOE Energy Information Administration figures) which effectively offset the modest reduction in energy burden, therefore, energy costs were not effectively reduced.

2. Increase the regularity of home energy bill payments? This data was not collected nor reported due to a variety of conditions. It had been incorrectly assumed that this information would be available from local fuel and electricity suppliers. This is not the case in rural Alaska.

3. Increase energy suppliers' contributions to reduce eligible households' energy burden? There was no activity in this grant that attempted to work with energy suppliers.

The \$1.2 Million dollars spent on the Alaska REACH program over three years time had a cumulative savings estimate of \$943,817.00 for the installed measures. Of that, roughly one third is attributed to the non energy benefit of client education.

- Cost per home to provide REACH (homes that received home visit) **\$835.07**
- Average State LIHEAP grant per household over program period **\$817.00**
- Average Rural Alaskan LIHEAP grant over program period **\$1,239.00 ***
- Average annual REACH expenditure over program period **\$400,000.00**
- Average annual LIHEAP expenditure over program period **\$15,000,000 ***

* these figures included disaster relief funds distributed during this period

Energy Savings

Home Visits

Alaska REACH recipients found great value in the education and service provided to them from the ECI members.

In the second and third year during telephone interviews one hundred low income LIHEAP/REACH recipients were asked :“What would you be willing to pay for these services if YOU had to pay for them?” The highest amount quoted was \$1,500 the lowest was \$0, the average dollar amount was \$241.35. Based on 1,437 home visits, the home visit aspect of ECI is valued at **\$346,820.**

Air Sealing

The pre- and post- blower door data was less than robust, however there was enough to come up with an estimated average reduction per dwelling and an average savings of \$50 annually per100 CFM⁵⁰ reduction, an estimated cost to savings ratio of 10.53.

Within the data sample there were homes which both increased and reduced their air tightness before and after (over and under ventilated dwellings), there were many small decreases as would be expected overall and a few large decreases. The evaluator feels that this was a small yet representative sample of the program overall.

1,437 homes tested calculating a life of measure savings estimated at \$198,905. less cost of materials of \$71,850 giving an estimated net savings from the program for this measure of **\$127,055.**

Refrigerator Replacement

Table 1 shows origin of savings figures, 23 units were replaced with an average annual savings of \$344 each and a life of 15 years for an estimated savings of \$118,680 less purchase price of \$11,598. The estimated net savings from this measure is **\$107,081.**

Heating System Replacement

39 pot burner type oil stoves were replaced with high efficiency units. Table 3 shows the origin of savings estimates. The program realized an estimated net present value savings of **\$78,000.**

Water Heater Replacement

6 water heaters were replaced, (Table 4) resulting in estimated savings from this measure of **\$79,800.00.**

Compact Fluorescent Bulbs

4,146 compact fluorescent light bulbs were distributed to REACH households in the last 2 years of the project. Since neither the wattage of the bulbs replaced nor and estimated hours of use were recorded, no direct savings can be calculated from this measure. However a conservative minimum savings estimate can be calculated.

Savings estimates are based on the replacement bulbs remaining in service for only 2.5 years (anticipated life is 5 to 10 years). Lamp use is based on 8 hours per day and a 45 watt reduction is assumed. Average savings per replacement bulb is calculated at \$25.344 per year at \$.20 per kWh. Less the cost of compact fluorescent bulbs at \$13.90 each, the net savings is estimated at **\$205,061.00**

I. PROJECT OVERVIEW

A. Description of Project

The Alaska Residential Energy Assistance Challenge (REACH) program, is a research and demonstration program funded by the Office of Community Services in the Administration of Children and Families of the U.S, Department of Health and Human Services. REACH provides a variety of services and benefits to clients who are recipients of a Low-Income Home Energy Assistance Program (LIHEAP). The programs are state-specific and offer a wide range of innovative approaches to low income home energy issues. The primary goal of the REACH program as stated by the Office of Community Services is to “demonstrate the long term effectiveness of supplementing energy assistance payments with non-monetary benefits that can increase the ability of eligible households to meet energy costs and help them achieve energy self sufficiency”.

REACH grants are made to state offices which administer the LIHEAP program. These offices are required to carry out their programs through community based organizations.

In Alaska the REACH program was implemented by Rural Alaska Community Action Program, Inc. (RurAL CAP), and the REACH program was named the Energy Conservation Initiative (ECI). ECI was a collaboration between RurAL CAP’s RAVEN AmeriCorps Program and the REACH program. The project was intended to decrease dependency on public assistance by measurably reducing the energy costs of 2,250 low-income households. The ECI project was designed with input from low-income people across the state along with technical know-how from Alaska’s home energy conservation and weatherization fields.

“The State of Alaska REACH Program/Energy Conservation Initiative will build the capacity of rural Alaskans to recognize and act upon energy conservation opportunities in their homes. Each project year 25 AmeriCorps Members will devote 20% of their year of service to address energy conservation issues and design and implement energy conservation activities in their own communities. Although program services will primarily be aimed at current LIHEAP recipients, other households will receive some program services in each of the 75 communities (25 communities/year x 3) where AmeriCorps members live.

The primary project assumption is based on the specific needs of rural Alaskans who heat their homes by fuel oil (purchased in advance), as opposed to others in urban areas who use a billing process. This requires significant "cash" up front to meet the needs of extremely cold and long winters in the target communities.”

Services proposed to address this assumption included: energy efficiency education, home energy conservation improvements, energy-efficient product initiatives, financial planning and budgeting assistance, facilitation of negotiation with home energy suppliers, and the production of an annual energy conservation bulletin which was distributed statewide.

Energy Conservation Initiative (ECI)

The project lists a number of expected program outcomes and goals, including:

- Significant increase in individual and community awareness of energy conservation issues/strategies/solutions;
- Reduced energy cost for participating households over one or more fiscal years;
- Increased regularity of home energy bill payments by eligible households; and
- Increased energy vendor contributions towards reducing energy burdens of eligible households

Within the first months of their AmeriCorps service, AmeriCorps members participated in a specialized energy conservation training event held in their region. Following this training, members returned to their home communities to implement the following energy conservation projects:

- AmeriCorps members conducted door-to-door home energy assessments targeting homes receiving energy assistance. These energy assessments included performing a “blower-door” test to detect and measure energy loss. Findings were entered into the AKWarm software program, which will be used to determine cost-effective energy-saving options.
- Based on the findings of the home energy assessments, AmeriCorps members paid follow-up visits to energy assistance recipients to discuss energy-saving tips and options.
- AmeriCorps members then worked with energy assistance recipients to provide low-cost home energy improvements totaling \$50 in materials per household. These improvements consisted of weather-stripping, caulking, insulating, and other sealing materials. Homes that are under ventilated will receive vents. AmeriCorps members will also provide these homes with \$100 each in incentives for utilizing household energy-saving products and equipment. These incentives include energy-efficient light bulbs, insulation materials, low-flow showerheads or pressure cookers.
- AmeriCorps members also worked with their communities to identify two households receiving energy assistance that faced a high energy burden and/or needed major improvements. Each of these homes will receive up to \$1,000 in repairs or improvements.
- In addition, AmeriCorps members provided all community residents with energy conservation information through energy fairs, school programs, energy conservation demonstrations or other educational activities.

Technical support for these activities was provided by RurAL CAP’s Energy Conservation Coordinator, other RAVEN AmeriCorps Program staff, the Alaska Cooperative Extension, the Alaska Building Science Network and the Alaska Housing and Finance Corporation.

B. Purpose of the Demonstration

REACH was designed as an energy education/conservation program. The original concept was that many homes were excessively “leaky” and that, for a small investment in air sealing, major improvements in air tightness and decreases in energy consumption could be accomplished. The proposed demonstration program results would be:

- Significant increase in individual and community awareness of energy conservation issues/strategies/solutions
- Development of local energy specialists in Rural Alaskan Communities
- Reduced energy cost for participating households over one or more fiscal years
- Increased regularity of home energy bill payments by eligible households
- Increased energy vendor contributions towards reducing energy burdens of eligible households

Target Population

The project participants were the LIHEAP recipients in AmeriCorps communities in Rural Alaska. Of the recipients served, the vast majority were Alaskan Natives. A majority of the AmeriCorps members providing the service were also members of the target population. An average 36% of the recipients were elderly or had children age 4 or under in the home. Obviously all recipients qualified for LIHEAP by income, yet the actual income level (percent above or below poverty) was not collected.

Unusually high home energy burdens challenge rural residents. In 55 rural villages, the estimated annual heating cost of a two-bedroom home heated by fuel oil ranges between \$2,200 and \$3,500/year. Close to half of the State of Alaska's LIHEAP households have income under 75% of the poverty level (75% of poverty for a household of 4 annual income is \$15,048). At 75% of poverty, a four-person household with a \$2,800 annual heating cost has an energy burden of 19%. At 50% of poverty, the energy burden is 28%. This contrasts with an average energy burden of 5.5% for low-income homes in the Lower 48 using fuel oil as their primary fuel.

The Average Alaska REACH community had a median household income of \$21,875 and 39.2% of residents were living below the poverty level.

C. Project Assumptions

In the original REACH 1998 proposal, the following assumptions were put forth:

Assumption 1: Rural Alaskan communities are faced with serious energy challenges, which left unresolved have dramatic economic, social and environmental consequences. Yet many rural Alaskans are unaware of the positive effect that simple, low-cost and no-cost energy saving measures can have on their family resources, health, and local environment.

Assumption 2: The need for energy-efficient homes is great. Facing long harsh winters, rural Alaskans require large quantities of fuel for heating. In Western, Northern, and Interior Alaska, temperatures frequently drop to minus 40 degrees Fahrenheit and remain there for weeks at a time.

Assumption 3: Unusually high home-energy burdens challenge rural residents. Compared with the average energy burden of 5.5% for low-income homes in the Lower 48 using fuel oil as their primary heating/cooling fuel (from the LIHEAP Home Energy Notebook for 1995), Alaskans face significantly more challenging energy issues.

The average \$2,800 spent annually by a four-person household in rural Alaska for heating represents 19% of the total annual income if the family earns 25% less than the poverty level, and 28% of the total annual income if the family earns 50% less than the poverty level.

Assumption 4: Air leakage is a major problem in rural Alaska. According to a 1996 Alaska Housing Finance Corporation report, “air leakage is one of the biggest problems the weatherization program addresses. Air infiltration and exfiltration are often the cause of high utility bills, moisture problems, ice dams, air quality contaminants, mold, drafts, and discomfort.”

Assumption 5: There is tremendous potential for electrical energy conservation to benefit rural Alaskans. In addition to heating costs, electric bills also pose significant challenges for rural Alaskans.

Assumption 6: Without alternative economic activities, traditional villages will continue to combine high home energy requirements with low or no income to create crisis energy situations for many households. Although the traditions and activities of a subsistence lifestyle can strengthen the fabric of the community, they do not produce significant income.

Assumption 7: Change is most successfully implemented from within the community.

Assumption 8: The Energy Conservation Initiative will be fully integrated with existing AmeriCorps activities, giving it a strong framework in which to succeed. Members will have the local knowledge and program flexibility to adapt easily to requests and recommendations.

Assumption 9: Collaborations are stronger than individual initiatives. The RurAL CAP Energy Conservation Initiative will tie together existing programs, complementing their services and providing a more holistic approach to energy conservation in the jointly-served communities.

Assumption 10: The holistic approach of this program will help ensure that communities are not changing one environmental issue for another, possibly more difficult-to-solve issue.

Assumption 11: There will be measurable results demonstrating the effectiveness of both monetary and non-monetary activities of the program helping to reach the program goals. This initiative will be undertaken with the assumption that the 25 AmeriCorps members each year, in conjunction with the Energy Conservation Coordinator can and will make a difference in the lives of many rural Alaskans.

Project Intervention

The ECI project was designed to promote energy conservation and cost-saving initiatives for low-income rural Alaskans primarily through the RAVEN (Rural Alaska Village Environmental Network) AmeriCorps Program. Established in 1995, the mission of the RAVEN AmeriCorps Program is to develop the capacity of communities and individuals to pre-vent pollution, conserve resources, improve environmental conditions, and develop sustainable lifestyle strategies in rural Alaska. Based on traditional values of respect for the land, this program builds upon the unique cultures and lifestyles of rural Alaskans to strengthen the awareness of, commitment to, and participation in local environmental challenges. Locally recruited AmeriCorps members act as village environmental coordinators as they involve community members and organizations in implementing broad-based education and environmental projects focused on improving environmental and human health. Because they are recruited from their own community, AmeriCorps members have the best understanding of how to get things done for their villages.

Starting in January of 1999, 25 RAVEN AmeriCorps members each year participated in the ECI project by devoting 20% of their full-time year of service to designing and implementing energy conservation activities in their own communities. At each January orientation for new AmeriCorps members, a special session explained the purpose of the ECI. With AmeriCorps members' year of service running from January of one year to the end of the following January, it was necessary for members to focus on energy conservation right away in order to reach our annual goals.

During the January Orientation, another special session was conducted for site supervisors, who were responsible for working with and supervising the AmeriCorps members locally, so that the local tribal office could provide support for the AmeriCorps member. If a member left the program before the year was complete, the site supervisor could help to ensure that the community was still given the opportunity of receiving the benefits of the ECI.

In addition to the introduction at the January Orientation, AmeriCorps members participated in a specialized three to four day energy conservation training event held in their region within the first few months of their AmeriCorps service. Members had the opportunity to work on actual LIHEAP homes. Following this training, members returned to their home communities to implement the following energy conservation projects:

- AmeriCorps members conducted door-to-door home energy assessments for LIHEAP recipients. These energy assessments included performing a blower-door test to determine air tightness and ventilation requirements. Findings were then entered into AkWarm home energy-analysis computer software, which recommended energy-saving techniques specific to each home.
- Based on the findings from the home energy assessments, AmeriCorps members followed-up with LIHEAP recipients to discuss energy-saving options and budgeting for energy expenses.
- AmeriCorps members worked with LIHEAP recipients to conduct low-cost home energy improvements totaling \$50 per household of weather-stripping, caulking, insulating, and other sealing materials. AmeriCorps members also provided these homes with \$100 each in additional materials or incentives for utilizing household energy-saving products and equipment. Examples of these incentives include energy-efficient light bulbs, insulation materials, low flow showerheads, or water heater blankets.

- AmeriCorps members also worked with their communities to identify two LIHEAP households that became demonstration energy-efficient homes. Each of these homes received up to \$1000 in repairs or improvements during the first year. By the second year of the grant, we increased this number to \$1500 because of budget surpluses created through attrition of those members who did not finish their year of service.
- In addition, AmeriCorps members provided all community residents with energy conservation information through energy fairs, school programs, energy conservation demonstrations or other educational activities.
- RurAL CAP's Energy Conservation Coordinator, RAVEN AmeriCorps Program staff, and other program collaborators provided technical support for these activities.

F. Expected Project Outcomes

- Significant increase in individual and community awareness of energy conservation issues/strategies/solutions
- Incentives and rewards offered and used to initiate further energy conservation within households
- Reduced energy cost for participating households over one or more fiscal years
- Increased regularity of home energy bill payments by eligible households
- Increased energy vendor contributions towards reducing energy burdens of eligible households
- Capacity of one or more community residents to understand and explain residential energy conservation
- Reduced health and safety risks resulting from high energy burden
- Baseline data on housing conditions in 75 rural Alaskan communities

G. Program Logic model

OBJECTIVES	INDICATORS	VERIFICATION	ASSUMPTIONS	OUTCOME
Program Goals:				
REACH Participants become self sufficient				
Reduced dependence on energy assistance programs	Decrease number of LIHEAP applicants in AmeriCorps Member Communities from year 1 in 1998, to year 2 in 1999 and year 3 in 2000	Review state applications for LIHEAP		Number Fluctuations not attributable to REACH
AmeriCorps Members (ACM's) become community resource as local energy conservation specialists	25 ACM's each year	AmeriCorps Program Member development Reports	AmeriCorps Members receive training and remain in community	73% retention rate Annual attrition 6.66 ACM's per year
Intermediate Outcomes:				
LIHEAP Recipients increase energy awareness	10,500 LIHEAP Recipients receive energy conservation Packet in mail	Energy Coordinator Reports Mail Meter Machine Records	All LIHEAP recipients have mailing addresses	Target Reached
REACH Participant dwelling experiences lower energy bills	Participants energy use decreases by at least 10% during program year 1998, 99 and 2000	AKWarm post- improvement rating	LIHEAP Recipient becomes REACH Participant in ACM Community	Energy use reduction decrease not verifiable
REACH Participants have more disposable income.	Electric Utility Bills paid on time	Electric Utility Company Reports	PCE subsidy to rural residents continues to receive funding	Data uncollected and not available
Immediate Outcomes				
LIHEAP Recipients increase energy awareness	LIHEAP Recipients receive Energy Conservation Packet	Follow up survey	LIHEAP recipients reads information in packet	

OBJECTIVES	INDICATORS	VERIFICATION	ASSUMPTIONS	OUTCOME
REACH recipients decide to participate in program	90% answer door agree to energy assessment	ACM Quarterly reports ACM Notes and Home Visit Reports	Customer desires to lower energy consumption	Target Reached
REACH recipients observe and participate in home assessment	ACM's conduct blower door tests and suggest improvements on 80% of dwellings	Completed AKWARM and blower door test	Tests are conducted and completed on 80% of dwellings in ACM communities	AKWARM not performed on 80% Post blower tests not conducted on 65% of homes
REACH participants demonstrate knowledge of energy conservation and budgeting skills	70% of participants use energy conservation budgeting techniques within 6 months	Follow-up survey		
REACH recipients allow and/or participate in making immediate repairs or improvements	90% of Reach recipients in all 25 ACM communities receive at least \$150 in repairs/incentives	ACM Quarterly Reports ACM Notes and Home Visit Reports	Improvements to dwelling are needed	90% of REACH recipients in 73% of the communities were served
REACH recipients allow and/or participate in making major repairs or improvements	5% (2 per ACM community) of REACH participants (most in need) receive major improvement (\$1000 each)	ACM Quarterly Reports ACM Notes and Home Visit Reports Purchasing Records	Major improvements are needed	Due to attrition in communities a larger number of REACH recipients in remaining communities received major improvements
Training Budget and Schedule for Activities				
<u>AmeriCorps Members</u> receive training in basic building science, AKWarm energy analysis software and airtightness testing	24 of 25 ACMs participate in 4 days of training each year of service	Energy Conservation Coordinator quarterly reports	ACMs are able to attend the regional training	18 of 25 stayed with the program each year on average, all who stayed received training
<u>LIHEAP</u> Recipients receive energy education Packets in Mail	LIHEAP Recipients receive energy conservation Packet in mail	Energy Coordinator Reports Mail Meter Machine Records	All LIHEAP recipients have mailing addresses	Target Reached

OBJECTIVES	INDICATORS	VERIFICATION	ASSUMPTIONS	OUTCOME
REACH Recipients receive energy education and information from ACM's	20 of 25 ACMs conduct energy education for 100% of REACH recipients	ACM Quarterly Reports ACM Notes and Home Visit Reports		18 of 25 ACM's conducted energy education for 90% of REACH recipients
REACH Recipients receive in-dwelling education through participation in energy audit and airtightness testing.	Airtightness testing for 80% of REACH recipients during year of service for each year	ACM Quarterly Reports ACM Notes and Home Visit Reports		Target reached
Perform energy assessment on dwellings Make improvement decisions	Airtightness testing for 80% of REACH recipients during year of service for each year	AKWARM energy rating and airtightness testing results	20% of dwellings will not be able to receive airtightness testing	Target Reached
REACH Recipient selects up to \$150 in air sealing materials	90% of REACH participants in all 25 ACM communities receive at least \$150 in repairs / incentives	Materials orders ACM's reports	ACMs offer opinions and use AKWARM software to evaluate cost effectiveness ACM's blower door test indicates need for air sealing	

OBJECTIVES	INDICATORS	VERIFICATION	ASSUMPTIONS	OUTCOME
Surveys & Monitoring				
Collect Baseline data on LIHEAP recipients energy use	From LIHEAP Provider application	Application Review	All LIHEAP providers collect similar data	Sparse and incomplete from some not all collect similar data
Collect Baseline data on LIHEAP recipients energy use	House Visit Checklist	Checklist Review	Participants fill out application	Not Collected by ACM
Collect Baseline Data on REACH participants dwelling energy use	AKWarm and airtightness test results	AKWarm As Is energy rating	ACMs perform AKWarm and airtightness test on 80% of the REACH dwellings	AKWARM not performed on majority of dwelling in all years
Collect Pre- and Post- Blower Door test data	Airtightness test results	Airtightness test results	ACM's perform airtightness tests	Majority of Post blower door testing not performed
Interview ACMs		Blind Interview notes	Still with Program	Completed
Mail surveys/questionnaire to participants		Mail logs	Participants respond to questionnaire / survey	10% of mail responded, changed to phone year 2 & 3
Inspect measures installed		On-site inspections	Measures were performed	Some reported measures not performed 1 st year
Interview participants on site		Travel logs	Participants will agree to interview	Completed

II. Project Implementation

Initial Development and Start Up

The Alaska REACH program was designed in such a manner as to have, for all practical purposes, three program start-ups. Each year of the program, 25 new members and communities are selected to be the RAVEN AmeriCorps sites.

The first start-up of the Alaska REACH program had a delayed beginning. The initial Award from OCS came to the State of Alaska's Department of Health & Social Services just before an October 2, 1998 meeting of the Legislative Budget and Audit (LB&A) committee, which has authority to authorize the expenditure of federal funds during the interim period of legislative sessions. (Alaska's legislature convenes for no more than 120 days beginning in January of each year.) The Department had no time to pre-prepare the committee for this request by providing advance information to the committee members. The result was that authorization to expend these funds was denied at that meeting. Several months passed until another meeting of the LB&A committee was held on December 11, 1998. During that time the Department was able to disseminate information about the REACH program to LB&A committee members and the authorization to expend the funds was granted on December 11, 1998. However this resulted in a several month delay before the program could be implemented. Once funding authorization was given, rather than delay the implementation of the program nearly one year, RurAL CAP decided to begin the Energy Conservation Initiative (ECI) program with the current group of RAVEN AmeriCorps members. This decision created some implementation problems that were directly related to the late start caused by the delayed authorization. Raven AmeriCorps communities and members were selected without being able to consider how the ECI Program fit into the RAVEN AmeriCorps and community activities that year. As a result, AmeriCorps members felt they were given additional duties after the fact. Some of the selected communities had extensive weatherization programs planned or in progress, training for the ECI program had to be rapidly implemented and the contract for evaluation services was delayed nearly six months past the delayed project implementation.

Project elements implemented

The essential elements of energy education training, home assessment, low and high level follow-ups, and incentives were immediately implemented during the first year program start-up.

- Recruitment for the ECI's Energy Conservation Coordinator occurred in January. Patrick Lawlor was hired to fill the position and began work January 26th, coinciding with the same week the 25 new 1999 RAVEN AmeriCorps Members received their orientation training in Anchorage (January 26th-29th). As part of his orientation to the program, the Coordinator also participated in Cold Climate Building/Residential Retrofits and Blower Door Certification Training through the Alaska Building Science Network (ABSN) from February 22nd-26th in Bethel.
- RurAL CAP received a commitment from the Alaska State Office of the Corporation for National Service to place a full-time VISTA Member with the RAVEN AmeriCorps Program in June of 1999. This VISTA Member devoted the majority of his/her year of service to assist the Energy Conservation Coordinator in developing ECI educational and training components, and supporting RAVEN AmeriCorps Member project activities

- Three blower door test kits were purchased from The Energy Conservatory to assist AmeriCorps Members in conducting home energy assessments. In total, five blower doors rotated between the 25 AmeriCorps Member communities --giving the members an average of three to four weeks each with the equipment to conduct home assessments.
- Training materials were developed for the four regional Energy Conservation Trainings. These included an AmeriCorps Member Energy Conservation Manual, educational handouts and books to assist members in their roles as community educators. Also, the Alaska Cooperative Extension supplied in-depth building science manuals and handouts for the AmeriCorps members.
- Two regional Energy Conservation Trainings for AmeriCorps members were conducted, with a total of 14 AmeriCorps members participating. The trainings took place in Fairbanks from March 8th-10th, Anchorage March 23rd-25th. (Additional trainings in Kotzebue and Bethel for the remaining 11 AmeriCorps Members occurred in April.) These three-day training events introduced members to ECI goals and objectives, basic building science concepts and energy conservation strategies. The workshops provided members with hands-on training in performing home energy assessments through the use of blower door testing and AKWarm software. Members also learned to conduct low-cost, energy-saving home repairs, by practicing caulking and weather stripping techniques on demonstration homes. Workshop facilitation and technical training assistance was provided in collaboration with the Alaska Cooperative Extension, ABSN, and RurAL CAP's Weatherization Department.
- Utilizing funds from a separate grant five portable computers were purchased to assist AmeriCorps members in assessing home energy loss and potential savings through the use of AKWarm software. Ginny Moore of ABSN trained members in the use of the AKWarm program at the regional trainings. The AKWarm program was to assist ACMs in assessing community members' energy use, determine their most cost-effective options, compare their energy performance with others, count their savings and focus on improvements, optimize design for cost savings and provide pre- and post- data for evaluation. Each member was given a copy of the AKWarm program for use in their office computers (if available) as well.
- With the advice of weatherization professionals at RurAL CAP, ABSN, and the Alaska Cooperative Extension, energy-saving product materials appropriate for rural Alaskan homes were researched and identified. These materials were purchased and distributed to AmeriCorps members for their use in conducting home energy improvements.
- Collaborative relationships were further developed between program partners and the University of Alaska, Fairbanks' Cooperative Extension, ABSN, and the Alaska Housing Finance Corporation (AHFC). The Alaska Cooperative Extension was an invaluable resource in providing program guidance and technical training support. The ABSN contributed experienced trainers for the regional workshops and provided members with technical support in conducting home assessments. AHFC's Research Information Center provided general information and supplied the program with educational materials (such as energy conservation coloring books and energy handouts) for distribution in AmeriCorps Member communities.

- Andrew Pascale, a VISTA Member working with the Alaska Cooperative Extension in support of the REACH program, finished his year of service August 15th. Ursula Graham replaced him in that role for one year followed by Brooke Kirkland for the final year of the program. The position served as a resource for building science information to be distributed by the AmeriCorps Members to their rural communities. In addition, Andrew, Ursula and Brooke worked with Alice Stonecipher and Patrick Lawlor of RurAL CAP to further develop the RAVEN AmeriCorps Member's manual and the procedures for home assessments.
- Rich Seifert and Bob Maxwell, the evaluators for the ECI, and the Vista Volunteers participated with RurAL CAP in developing the evaluation process. RurAL CAP's David Hardenbergh, Cathy Clements, Brian Connors, Patrick Lawlor, Rayna Swanson and Alice Stonecipher also attended. The Logic Model and the Outcome Measures evaluations methods were both discussed. RurAL CAP used the Outcome Measures internally for evaluating the program.

Program Changes and Modification

- Members sometimes did not feel comfortable working on other people's homes in their community, and some of the LIHEAP residents themselves did not want to have someone else work on their homes. Since there was hesitancy on the part of both AmeriCorps members and residents, AmeriCorps members concentrated on *educating* the homeowner, using the results from the blower door and AkWarm, and then offering the materials and products to the residents to use themselves in these instances.
- AKWARM was determined to be extremely difficult for some members. Program Evaluators determined that homes not receiving any changes did not need to have AKWARM performed. In practice most AKWARM activities were not completed at all and the expected data was not available for evaluation purposes.
- The number of LIHEAP homes in each individual community varied significantly, creating a need to enlist the efforts of ACM's in communities with few LIHEAP recipients to assist nearby communities with large LIHEAP populations.
- Numerous homes were found to be under-ventilated and anticipated savings from air sealing were not realized. This raised serious health and safety concerns resulting from the high energy burden of program participants. The program was modified to include program recipient education of indoor air quality issues and consideration of providing CO detectors in homes that were found under ventilated and in danger of having combustion gasses from propane cook stoves or woodstoves remain in the home.
- The health and safety issue around indoor air quality is most pressing for the Rural Alaskan program recipient. This is a particular problem of Western and Northern regions of the state. Smaller homes and, in some instances, higher occupancy rates have lead to concerns about indoor air quality. When AmeriCorps Members found homes that were under-ventilated air sealing was not performed and they then educated the homeowners about the problem and offered ventilation strategies as one of the incentives. Some of the homeowners had existing mechanical ventilation systems in place but were not using them and in some instances had the vents blocked off. These homes were designed to have mechanical ventilation, and when the ventilation is not in operation the homes do not get an adequate air supply for the health of the residents and the home. Members explained to the LIHEAP residents the importance of ventilation to improve indoor air quality. Client survey indicated that this was valuable and appreciated information.

- Electrical conservation opportunities seemed to be available and of greater or equal value to members with adequately sealed homes. AmeriCorps members were provided electrical wattage gauges to check appliance kilowatt-hour (kWh) usage. By entering in the cost of a kWh for that community, AmeriCorps Members and homeowners were able to determine how much it cost to operate that appliance for the month and the year.
- Therefore the program shifted some of the emphasis from air sealing to electrical efficiency during the second year implementation. Energy meters were purchased and program recipients were educated in the energy consumption of their different appliances. Implementation of refrigerator replacement as one of the major incentives was performed in the second and third year.
- Twenty-three energy-efficient refrigerators were installed in twelve RAVEN AmeriCorps the most inefficient units were replaced with more efficient units in order to reduce the high electricity bills for these low-income residents.

Intervention Activities

- Materials were developed for the annual regional Energy Conservation Trainings. These included an AmeriCorps Member Energy Conservation Manual, educational handouts and books to assist the members in their roles as community educators. Also, the Alaska Cooperative Extension and Alaska Building Science Network supplied in-depth building science manuals and handouts for the ACMs. Thirteen of these trainings were held over the three year project.
- The trainings took place in regional hubs and all ACMs in that region attended, or we arranged for them to attend another training if they were unable to attend the local one. These trainings began as three day events, but were extended to four days the second year due to the amount of information provided. During this time, members were introduced to ECI goals and objectives, basic building science concepts, ventilation, indoor air quality and energy conservation strategies. The workshops provided hands-on training in performing home energy assessments through the use of blower door testing and AKWarm software. Members also learned to conduct low-cost/no-cost, energy-saving home repairs, by practicing caulking and weather stripping techniques on demonstration homes. The level of understanding of these difficult topics and confidence in their ability to complete the necessary tasks was greatly increased, and they were then able to make improvements to homes in their communities without diminishing the indoor air quality or compromising the home itself. Workshop facilitation and technical training assistance was provided in collaboration with the Alaska Cooperative Extension, ABSN, and RurAL CAP's Weatherization Department.
- 128 homes in the 55 communities served received more extensive energy conservation improvements. Items purchased and installed included, but were not limited to, on-demand water heaters, high efficiency heaters, insulation, windows and doors, roofing materials, and solar photovoltaic panels.
- Approximately 10,000 energy conservation bulletins were distributed to rural LIHEAP households each year. The bulletins outlined various simple no/low cost methods by which LIHEAP recipients not served directly by the program could save money by reducing their overall energy burden.

- RAVEN AmeriCorps members worked with school children in the classrooms to combine energy conservation with environmental education. Games and handouts were developed so that along with other items and AmeriCorps members were able to take energy conservation information more fully into the classroom setting. The Program also purchased two activity kits for each member to take into the classrooms: a Solar Energy kit that teaches basic energy education with a focus on solar energy, and a *Hot Leads* kit which teaches the basics on how electricity works. In addition, we purchased Energy Conservation schoolbooks and coloring books from *Environmental ACTION* that members distributed to students.
- Flyers and handouts and home environmental wheels that focused on Energy Conservation on one side and on Indoor Air Quality on the other were purchased to help ACMs educate the community on these topics. Another aspect of community education took place as ACMs were working on the houses in their communities. Homeowners were educated in their own homes about building science and weatherization, as well as easy and cost-efficient ways to reduce their utility bills. ACMs also educated homeowners about budgeting their money to pay these bills, in order to avoid utility shut-offs. Survey of program recipients found a very high level of appreciation for the education services. The majority of respondents indicated that they had greatly improved their understanding of building performance and energy efficiency. The blower door tests were the most valuable activity as far as the REACH participants were concerned.
- An energy fair exhibit was developed by the Program and improved upon by VISTA member Brooke Kirkland. It was used in the AmeriCorps trainings as well as in AmeriCorps communities for health fairs and in the classrooms with children. Along with handouts and posters, this exhibit contained an energy model house, a light with both incandescent and compact fluorescent bulbs, two different types of shower heads and a couple of the incentives that we distributed. Another item included was a Carbon Monoxide (CO) detector to help educate residents about the dangers of CO poisoning.
- By the third year, eight blower doors were rotated between the 25 communities, giving each community, on average, two months to perform the needed assessments. The blower door kits included the tools and equipment needed to perform the basic assessment and air sealing. A ninth blower door was used at trainings and as soon as the last training of the year was completed, it was sent out to an AmeriCorps member.
- In homes where the homeowners were not comfortable having someone else work on their home, we fostered a “self-help” atmosphere. After completing a home assessment, we allowed members to provide the homeowner with the necessary materials to make the improvements on their own.
- Incentives were selected in consultation with ABSN and RurAL CAP Weatherization professionals. Examples of energy-saving items included as incentives are compact fluorescent light bulbs, low-flow showerheads, water heater blankets, plastic window kits, pressure cookers, and outlet insulators. LIHEAP recipients in RAVEN AmeriCorps communities served by the Program received all of their incentives by the end of the grant period.
- AmeriCorps members contacted 1437 LIHEAP homes that received home visits and direct recipient education with blower door testing in 55 communities across Alaska, during this three-year program. The total number of LIHEAP homes for the 55 communities was 1,600 receiving energy conservation products and incentives. They applied or distributed over

3500 tubes of caulk, 600 door strip sweeps, and 600 rolls of weather-stripping to over 1600 homes.

Facilitators and Barriers to Project Implementation

Facilitation of the project was enhanced by collaboration with the following organizations:

- The Alaska Cooperative Extension Service
- VISTA
- Alaska Building Science Network (ABSN)
- Tribal and City Councils
- State of Alaska Division of Public Assistance
- State of Alaska Department of Environmental Conservation
- Alaska State Community Service Commission
- Alaska Housing Finance Corporation
- US EPA Alaska Operations Office
- RurAL CAP's weatherization program brought a wealth of expertise, support and information in program implementation as well as program modifications.

A significant finding that was assumed but not thoroughly examined or reported is that the majority of the RAVEN AmeriCorps members themselves are LIHEAP recipients. At least 60 percent of AmeriCorps members were LIHEAP recipients themselves, and they have now received training and are able to educate others about energy conservation.

Some of the obstacles to program implementation included:

- Difficulty was experienced in identifying \$1000 incentive opportunities in communities that had recently completed major low income weatherization projects.
- RurAL CAP found pre- and post- blower door testing in the third year to be too difficult to coordinate with the available equipment. No Post- blower door tests were conducted in the majority of communities making data for this evaluation less than robust.
- Obtaining the list of LIHEAP recipients in communities served by tribal LIHEAP providers was sometimes a problem. The program was advertised through posters displayed at the tribal council offices, on public bulletin boards and through public service announcements on local radio stations. With this approach, those receiving LIHEAP who were interested in the service contacted their local AmeriCorps member to participate. After confirming households letter of approval for receiving LIHEAP, the RAVEN AmeriCorps members performed energy assessments and offered the incentives.
- Receiving fully completed home assessment packets was a major problem for the ECI. Many AmeriCorps members only partially filled out the forms, and in some instances, they offered the incentives to the residents, but did not complete home improvements.

- In general, LIHEAP recipients are typically mobile households and often moved out of our communities before the ACM could begin assessments. Others moved back in with parents or into homes with other LIHEAP recipients. Still other recipients either live part time somewhere else, or are out hunting and fishing for months at a time to support their subsistence needs. Due to this LIHEAP recipient attrition rate, the task of tracking down all the residents on the LIHEAP lists was sometimes difficult, especially in larger communities.
- In the first year of the program, residents were given the option of selecting a \$150 coupon that they could submit for reimbursement after purchasing energy efficient products. Residents were given a year to use them, with the hope that this would be an encouragement to purchase energy saving materials and products locally. This option was phased out because only four of the 24 coupons issued were reimbursed.
- Identifying and selecting the homes for more extensive improvements took longer than we had anticipated, delaying the project substantially. In order to take the burden and politics off the ACM, the local tribal council assisted members in selecting the homes. There were occasions the councils didn't act in a timely manner, however. Sometimes the problem was a long gap between tribal council meetings, especially in the summer during subsistence hunting and fishing seasons. Another reason was that members sometimes felt intimidated about addressing the council during the selection process.
- The computer program AKWarm had mixed success. While some AmeriCorps members found the program very informative and useful, others found it hard to use. This was due to the fact that some members had little or no experience working with computers and little knowledge of building construction. Although some members did eventually have success using the program itself, AKWarm's original purpose of data collection and comparison of data before and after the home improvements were made did not happen because members did not complete follow-up assessments using AKWarm.
- In addition to the lack of AKWarm data collection following home improvements, blower door tests were not conducted after improvements were conducted. Because there were more members than blower doors, each member had a very limited amount of time to use it. Members often did not have the blower door and materials on site to make immediate repairs or improvements, and were forced to order them from hub communities or Anchorage and wait for their arrival. The blower door was often shipped to another member before the first member had an opportunity to order the necessary repair materials, make the house improvements, and run the post- improvement blower door test.
- AmeriCorps member-attrition rate of 27% was due to a range of issues from the lack of competent childcare to alcohol problems and domestic violence, or offers of full time employment. Each year, we had a few communities where the AmeriCorps members left the program before the ECI could be implemented fully. In these instances RurAL CAP worked closely with village housing officers or other personnel in order to complete activities in the community.
- RurAL CAP staff changeover also became an issue within this program during the final year. Data collection and record keeping did not remain consistent. The Energy Conservation Coordinator, Patrick Lawlor, left the position in May of 2001. Former VISTA member and part time ECI employee Ursula Graham then finished up much of the coordinator responsibilities, but she too left at the end of the grant period.

- Some of the AmeriCorps communities had undergone extensive weatherization programs before the ACMs began their service. In these communities, we attempted to provide alternative energy-saving home repairs and incentives that would complement existing weatherization efforts.

III. Evaluation Approach

The evaluation method initially proposed was to “measure the program activities efficacy in achieving stated goals related to reducing participant home energy costs and increasing the ability of participants to meet such costs independent of payment subsidy.”

The proposal indicated that for outcome evaluation the data collection tools would be internal CBO records and the external data collection methods would consist of :

1. Client questionnaires – requesting information on fuel consumption costs from LIHEAP recipients who received service from AmeriCorps Members;
2. Community store surveys – requesting information from stores in AmeriCorps member communities regarding baseline data on their stocking of energy efficient products;
3. Site Visits to 20% of the communities chosen randomly – site visits include interviews with program recipients, AmeriCorps members and other community members. Some trips would be timed to coincide with scheduled energy fairs.

The Logic Model and Evaluation Plan developed after the program was funded, recognized that the survey questions on fuel use could be helpful, but would not be weather averaged nor account for price fluctuations. The evaluators' experience in rural Alaskan communities gave insights into the problems with record keeping, the culturally inherent approach to sharing (which includes fuel oil), and also helped identify that a single group study was the only approach possible as a properly formed control group is not possible in such small isolated communities.

Therefore, the decision was made to include the AKWarm energy modeling software as a CBO data collection tool in order to gain empirical data before and after service impact. In conjunction with these results, pre- and post- blower door testing would give accurate and measurable data to evaluate the energy saving benefits from REACH activities.

As is often the case in program implementation, the completion of required tasks becomes the overriding goal and data collection takes a back seat to implementation. This program was no exception. Numerous AKWarm files were submitted blank or containing incomplete data. None of the higher level investments of building materials were tied to AKWarm files. Pre- and post-blower door testing was very limited, and while the important pre- air sealing testing was performed on 90% of the homes receiving energy conservation products and incentives, thus preventing under-ventilation and other building problems associated with undisciplined energy conservation activities, it did little to provide a robust database from which to capture all the benefits of the activities.

The conclusions and finding in this report are therefore based on very weak and limited data and the savings estimates are derived from additional information obtained by the evaluator in conjunction with other cited studies. In every case the analysis has been conservative, based on the lesser values obtained from the available data.

IV. Conclusions and Findings

The REACH program announcement stated that an objective of every State REACH project should be to measure cost effectiveness. The GAO report questioned whether REACH program activities are more cost-effective in the long term than energy assistance payments alone. The evaluator feels that these two program approaches are not comparable. If the question is actually whether the Alaska REACH program was cost effective, given the parameters for a cost effective program to be one dollar in savings for each dollar spent or greater, then the Alaska REACH project did not meet this definition. Many activities has very significant cost savings, many others may have demonstrated cost effectiveness had data collection been more thorough and the data more robust, but that is pure speculation and is now a question that cannot be answered. Even if the Alaska REACH activities were cost effective, this could not be construed to mean that REACH would be an acceptable substitute for energy assistance payments. It is quite clear that without the energy assistance payments many REACH recipients would not be in a position to receive REACH services as they would as they would be forced to relocate to another dwelling, community, or become homeless

According to a GAO report on REACH, three other performance goals / questions were posed in legislation authorizing the REACH program as follows:

Does the REACH program;

1. Reduce energy costs of participating households? Clearly the energy burden was reduced modestly for the majority of participating households, significantly for the 10% who received the higher level of service (see tables and energy savings below). There was, however and 18% increase in the cost of home heating oil during the program period (US DOE Energy Information Administration figures) which effectively offset the modest reduction in energy burden, therefore, energy costs were not effectively reduced.

2. Increase the regularity of home energy bill payments? This data was not collected nor reported due to a variety of conditions. It had been incorrectly assumed that this information would be available from local fuel and electricity suppliers. This is not the case in rural Alaska.

3. Increase energy suppliers' contributions to reduce eligible households' energy burden? There was no activity in this grant that attempted to work with energy suppliers.

The \$1.2 Million dollars spent on the Alaska REACH program over three years time had a cumulative savings estimate of \$943,817.00 for the installed measures. Of that, roughly one third is attributed to the non energy benefit of client education.

- Cost per home to provide REACH (homes that received home visit) **\$835.07**
- Average State LIHEAP grant per household over program period **\$817.00**
- Average Rural Alaskan LIHEAP grant over program period **\$1,239.00 ***
- Average annual REACH expenditure over program period **\$400,000.00**
- Average annual LIHEAP expenditure over program period **\$15,000,000 ***

* these figures included disaster relief funds distributed during this period

V. Energy Savings

Home Visits

Alaska REACH recipients found great value in the education and service provided to them from the ECI members.

In the second and third year during telephone interviews one hundred low income LIHEAP/REACH recipients were asked :“What would you be willing to pay for these services if YOU had to pay for them?” The highest amount quoted was \$1,500 the lowest was \$0, the average dollar amount was \$241.35. Based on 1,437 home visits, the home visit aspect of ECI is valued at **\$346,820.**

Air Sealing

The pre- and post- blower door data was less than robust, however there was enough to come up with an estimated average reduction per dwelling and an average savings of \$50 annually per100 CFM⁵⁰ reduction, an estimated cost to savings ratio of 10.53.

Within the data sample there were homes which both increased and reduced their air tightness before and after (over and under ventilated dwellings), there were many small decreases as would be expected overall and a few large decreases. The evaluator feels that this was a small yet representative sample of the program overall.

1,437 homes tested calculating a life of measure savings estimated at \$198,905. less cost of materials of \$71,850 giving an estimated net savings from the program for this measure of **\$127,055.**

Refrigerator Replacement

Table 1 shows origin of savings figures, 23 units were replaced with an average annual savings of \$344 each and a life of 15 years for an estimated savings of \$118,680 less purchase price of \$11,598. The estimated net savings from this measure is **\$107,081.**

Heating System Replacement

39 pot burner type oil stoves were replaced with high efficiency units. Table 3 shows the origin of savings estimates. The program realized an estimated net present value savings of **\$78,000.**

Water Heater Replacement

6 water heaters were replaced, (Table 4) resulting in estimated savings from this measure of **\$79,800.00.**

Compact Fluorescent Bulbs

4,146 compact fluorescent light bulbs were distributed to REACH households in the last 2 years of the project. Since neither the wattage of the bulbs replaced nor and estimated hours of use were recorded, no direct savings can be calculated from this measure. However a conservative minimum savings estimate can be calculated.

Savings are based on the replacement bulbs remaining in service for only 2.5 years (anticipated life is 5 to 10 years). Lamp use is based on 8 hours per day and a 45 watt reduction is assumed. Average savings per replacement bulb is calculated at \$25.344 per year at \$.20 per kWh. Less the cost of compact fluorescent bulbs at \$13.90 each, the net savings is estimated at **\$205,061.00**

Tables & Charts

Figure 1. Survey Results

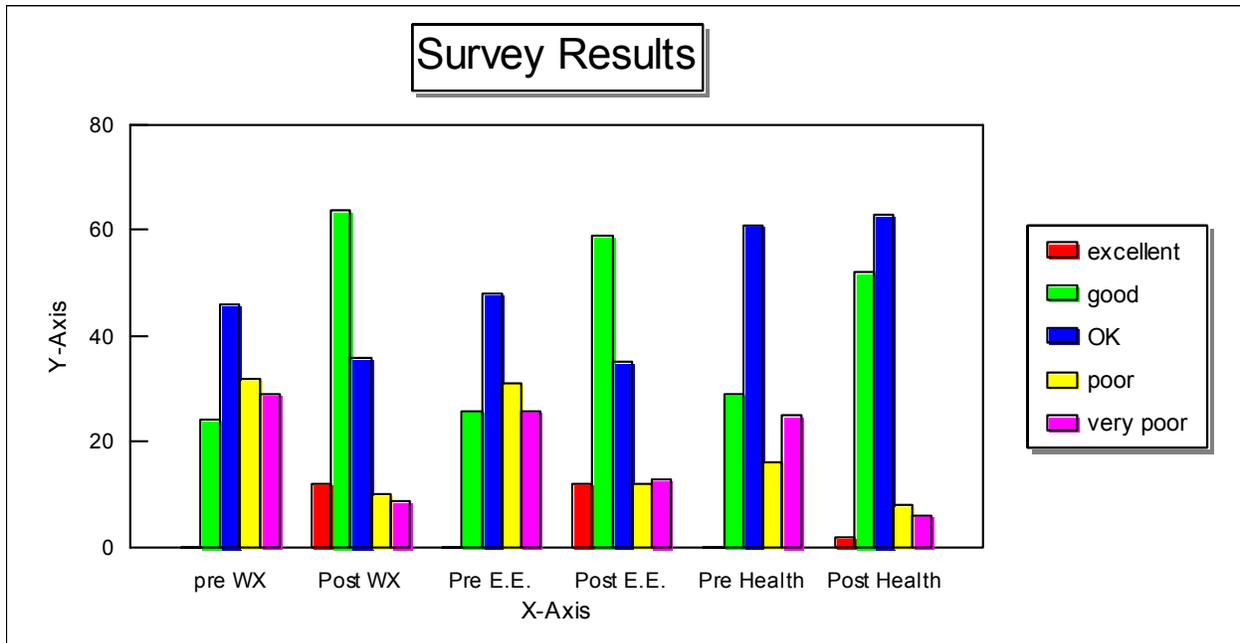


Table 1. Potential Value of Upgrading Refrigerator-Freezer Units

Year	No. of Units Purchased	Incremental Cost (\$) ^a	Annual Savings (\$ per Unit) ^b	Present Value of Gross Savings (\$ per Unit)	Net Present Value of Savings (\$) ^c
1	1,000	400	53	650	252,000
2	1,000	400	53	633	244,000
3	1,000	400	53	615	237,000
Each Ensuing Year	1,000	400	53		
Total after 15 years	15,000				\$3.1 Million

Source: Calculated by Northern Economics with cost estimates and energy usage figures from manufacturers.

^a Cost of energy-efficient, 16 cubic-foot refrigerator-freezer in Anchorage (Allen & Peterson, 2000) compared to ordinary model (Costco, 2000)

^b Assumes that a standard new model will require 700 kWh per year while an energy efficient model would use 435 kWh per year, and avoided cost is \$0.20 per kWh

^c Present value of savings minus one-time incremental cost; calculated with 3 percent discount rate and takes into account the value of all 1,000 units replaced each year

Table 2. Potential Per Home Benefit of Different Heating Retrofit Projects

Existing Heating Source	Retrofit	Potential Fuel Savings (Percent)	Potential Fuel Reduction (Gallons per House per Year) ^a	Cost of New System (\$)	Net Pre-sent Value of New System (\$ per Home) ^b
Pot Burner	Install Toyostove Laser 30	25 - 30	188 - 225	1,050 ^c	1,750 – 2,300
Inefficient Boiler	Replace Burner	20	140	650 ^d	1,400
Efficient Boiler	Tune Up	5	30	175 ^d	270

^a Assumes that homes heated with pot burners use 750 gallons per year, homes heated with inefficient boilers use 700 gallons per year, and homes heated with efficient boilers use 600 gallons per year. These figures give a weighted average of 700 gallons per home per year. Figures are consistent with numbers in the 1988 Analysis North report and findings from weatherization contractors.

^b Assumes \$1.00 per gallon and fuel savings are ongoing for 20 years, with a discount rate of 3.0 percent.

^c Cost of Toyostove (Laser 30) at the AC store in Nome—prices will vary by location.

^d Cost figures from weatherization contractors—actual prices will vary.

Table 3. Potential Per Home Benefit of Heating Retrofits

Existing Heating System	Saturation Level (Percent) ^a	Efficiency Measure	Net Present Value of New System (\$) ^b
All Oil or Pre-dominantly Oil	85		
Inefficient Furnace / Boiler	25	Replace Burner	1,400
Pot Burner / Cookstove	10	Install New Heater	2,000 ^c
Efficient Heating System	65	Tune-up	270
Other	15		
Inefficient Wood Stove	NA	None	0
Efficient Wood Stove	NA	None	0
Weighted Average			617

^a Figures are from conversations with weatherization contractors and weatherization program managers. The weighted average figure is a summary calculation based on other numbers in the table.

^b Based on 20-year planning horizon and 3 percent discount rate.

^c Average of \$1,750 and \$2,300 (from Table 2)

Table 4. Potential Per Home Benefit of Heating Retrofits

Existing Heating System	Saturation Level (Percent) ^a	Efficiency Measure	Net Present Value of New System (\$) ^b
All Oil or Pre-dominantly Oil	85		
Inefficient Furnace / Boiler	40	Replace Burner	1,400
Pot Burner / Cookstove	1	Install New Heater	2,000 ^c
Efficient Heating System	44	Tune-up	270
Other	15		
Inefficient Wood Stove	NA	None	0
Efficient Wood Stove	NA	None	0
Weighted Average			698

^a Figures based on data in RurAL CAP community database. The weighted average figure is a summary calculation based on other numbers in the table.

^b Based on 20-year planning horizon and 3 percent discount rate.

^c Average of \$1,750 and \$2,300 (from Table 2)

Table 5 summarizes the energy usage and costs of different water heaters. Figures in the table are taken from the Screening Report, but updated for an avoided cost of energy of \$0.20 per kWh rather than \$0.15.

Table 5. Cost of Water Heaters

Item	Annual Energy Requirements ^a	Cost (\$)		
		Capital Cost	Annual Energy Costs ^b	Present Value of Costs Over 20 Years ^c
Electric Tank Heater (50-Gallon)	5,690 kWh	340	1,100	17,000
Oil Tank Heater	180 gallons	1,000	180	3,800
Toyotomi On-Demand Heater	137 gallons	1,550	137	3,700

^a From AVEC

^b Based on \$0.20 per kWh (avoided cost) and \$1 per gallon

^c Uses real discount rate of 3.0 percent

Table 6 shows the potential total net present value of switching from electric tank heaters to on-demand oil heaters, not including consideration of bulk storage demands. Savings per unit are based on the difference between the cost of owning and operating an electric tank heater (\$13,000 over 20 years) versus an oil-fired on-demand unit (\$3,600 over 20 years).

Table 6. Potential Aggregate Benefits from Replacing Electric Tank Heaters with Oil-Fired Units

No. of Units Replaced	Net Present Value of Potential Savings (\$)	
	Per Unit ^a	Aggregate per 1,000 Units
1,000	13,300	13.3 Million

^a \$17,000 minus \$3,800 or \$3,700 (see Table 5)

The RurAL CAP community database shows that at least 52 percent of the homes in rural Alaska have water heaters, and 43 percent (roughly 6,700 heaters) are electric. This finding suggests that the savings of \$13.3 million per 1,000 heaters can be repeated many times.