Georgia REACH Project Energize: Final Program Evaluation (2006)

Prepared For:

Georgia Department of Human Resources
Atlanta, Georgia

Prepared By:

Roger D. Colton
Fisher, Sheehan & Colton
Public Finance and General Economics

March 2006

The work of Doug Bruchs & Sami Khawaja, quantec, llc (Portland, OR),
in providing the quantitative analysis of energy usage impacts
arising from the Project Energize efficiency interventions
is gratefully acknowledged.

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EXECUTIVE SUMMARY

In federal fiscal year 2002, Georgia submitted the state's request for four proposed projects to the U.S. Department of Health and Human Services (DHHS) Administration for Children and Families (ACF) Office of Community Services (OCS) and received one project approval. DHR's Division of Family and Children Services (DFCS) and the community action agency Partnership for Community Action, Inc. of Decatur (GA) collaborated to submit the "Project Energize" project to assist with addressing the need for reducing the energy burdens of low-income families, increasing the regularity of energy payments, increasing energy supplier contributions to the reduction of household energy burdens, and providing energy conservation tips and household budgeting education to low income families.

Project Energize was designed to target a specific segment of the LIHEAP client base. Georgia chose to focus on single-parent, female-headed DeKalb County households with children. Additional project eligibility criteria included living at the current residence for at least 12 months and not expecting to move within the next 12 months. Program outreach was targeted to families that have at least some income from wages

Project Energize was designed to improve the energy self-sufficiency of participating Cohort households. To accomplish this move toward self-sufficiency, Project Energize was designed to address some of the systemic barriers to energy self-sufficiency and to help families identify areas in which knowledge and behavioral changes would make a difference to long-term energy burden and payments. Project Energize provided an array of services to the 300 households that it intended to bring through the program. Included within that array of services were the following:

- Energy efficiency workshops;
- Mediation with energy providers to reduce arrearages and establish reasonable payment plans;
- Modified "weatherization" of housing units;
- Counseling in financial literacy and manageable budgeting;
- Referrals to community resources to serve as "effective bridges to outside services"; and
- Connecting families to "other services that can make a difference in their disposable income."

Not all of these interventions, however, were provided to all participants. Instead, the REACH project was designed to identify household-specific barriers to self-sufficiency and to implement specific interventions designed to overcome each of these specific barriers.

The goal of "energy self-sufficiency" is a difficult concept to define, let alone to operationalize, through a program such as REACH. Given the delivery of Project Energize services, it is

reasonable to expect that energy usage (and thus bills) will be reduced, home energy burdens will be made more affordable, usage will be brought more within the conscious control of individual households, and self-sufficiency will be enhanced.

PROGRAM SERVICES

One key activity in the delivery of energy efficiency services to Georgia REACH participants was the delivery of individualized energy education. Project Energize family advocates worked with family members to identify historical spending patterns and to prepare a future family budget. Family advocates also discussed income with the household and made appropriate referrals where necessary and appropriate to supplement household income. A less individualized, but nonetheless major source of energy efficiency training was provided through a formal group workshop presented by Southface Institute, one of the region's leading energy efficiency nonprofit organizations.

Project Energize devoted a limited amount of program funding to the payment of pre-existing utility arrearages in order to allow Cohort participants to free themselves of arrears that would make future bill payments unaffordable, even given usage and bill reductions attributable to the energy efficiency interventions directed toward the households. REACH family advocates helped Cohort participant households negotiate deferred payment plans for pre-existing arrears.

The Georgia REACH program invested considerable dollars in infrastructure improvements to the homes of Cohort participants in addition to providing energy education. The efficiency improvements came in the form of air sealing efforts (and the installation of other low-cost conservation measures) at the time of the home energy assessment. In addition, some major appliance replacement was funded.

During the six month period of program participation, Project Energize family advocates made periodic contact with the Cohort participants to assess whether the households were succeeding in the household budget and spending plans they had developed in collaboration with the family advocate, whether questions had arisen about energy usage or energy savings issues, or whether some other type of family crisis (*e.g.*, loss of job) had arisen that might benefit from outside intervention.

TWO PROCESS ISSUES

Risk Assessment

As part of its holistic approach to helping clients address their home energy affordability problems, the Georgia REACH project engaged a Risk Assessment Matrix. This Matrix allowed the REACH family advocates to identify a full range of issues arising as a result of home energy unaffordability. The family advocates could then not only address the energy issues through energy-specific interventions, but also address the corollary issues to enhance the effectiveness of the energy interventions.

The energy corollaries that were most commonly identified by the REACH family advocates within the Georgia REACH Cohort population included carrying utility arrears and paying late payment charges, experiencing high winter bill burdens, experiencing a non-weatherized home, experiencing a lack of control over expenses, experiencing an inability to respond to exigencies, and living with old and inefficient appliances. By far the most commonly identified risk, however, was simply that the household's income was insufficient. Of the non-energy risks, those associated with employment (or the lack thereof) and children predominated.

Energy-related risks were common to all levels of Federal Poverty Level within the Georgia REACH Cohort population. The percentage of all risks involving "energy risks" was roughly equal between Poverty Levels. The specific types of energy risks identified, however, differed markedly between income levels. For example, households at the lowest Poverty Level identified high winter burdens proportionately *less* often than did their higher income counterparts. In contrast, the lowest income households identified a "lack of control over expenses" proportionately *more* often than did their somewhat higher income counterparts.

The Georgia REACH project responded to each of these identified risks by identifying an intervention designed specifically to address the risk. The interventions, however, could easily *differ* as between households, since the interventions were intended to respond to the specific circumstances of the household. Targeting interventions tailored to the specifically-identified risks facing a household is an intense, and more expensive, proposition than delivering more generic energy assistance (either cash or efficiency investments). Nonetheless, the experience of the Georgia REACH project supports the conclusion that the adverse impacts of unaffordable home energy bills can manifest themselves as other than an "energy" problem. The experience of Project Energize supports the conclusion that targeted, tailored, household-specific interventions are an important aspect of responding to home energy unaffordability.

Client Satisfaction

Participants in Project Energize provided overwhelmingly favorable responses to the program through the exit interviews.

- 120 of the 136 households participating in the exit interview said that they "strongly agree" when asked whether Project Energize provided the services that were explained during the intake process.

- 114 of the 136 households participating in the exit interview said that they "strongly agree" when asked whether Project Energize met their expectations.

- 123 of the 136 households participating in the exit interview said "strongly agree" when asked whether Project Energize staff were caring, professional, knowledgeable and friendly.

- 114 of the 136 households participating in the exit interview said that they "strongly agree" when asked whether the household would continue to use the energy saving measures learned through Project Energize in the future.

The only possible component of Project Energize where satisfaction lagged involved the impact of the program on the total family. Only 74 of the households participating in the exit interviews responded "strongly agree" when asked whether Project Energize benefited the participant's children and made the children more energy conscious. In addition, 54 participants "agreed" that Project Energize benefited the children, while eight (8) Project Energize participants "disagreed" that the program benefited their children and made them more energy conscious. The efforts to encompass the entire family in Project Energize initiatives perhaps fell short of program expectations.

When providing unaided answers to open-ended questions in the exit interviews, Project Energize Cohort participants emphasized the conclusion that the intense interventions, and ongoing working relationships between project staff and the program's Cohort participants lay at the heart of the program. Of the 104 persons providing a response to the open-ended question about what respondents "liked best" about Project Energize, 61 provided a comment that explicitly cited the Project Energize staff.

While the list of quoted comments in the narrative is lengthy, each of these specific staff-related comments standing alone --and certainly the sum of these comments when considered in their totality-- support the conclusion that Project Energize accomplished one of the major objectives of the Georgia REACH program. Early in its REACH application, the State of Georgia said that what Project Energize was all about was to "systematically assess and identify the areas and levels of risk the family faces, assist the family in setting and working toward concrete goals, and combine supportive relationships with tangible help." It is impossible to review the exit interviews provided through Project Energize and conclude that the program did anything but accomplish that objective.

IMPACT EVALUATION

The broad objective of Project Energize was to assist participant households move toward energy self-sufficiency. "Self-sufficiency," however, is a squishy concept at best. The concept can be operationalized through the impact evaluation measures discussed below.

Home Energy Insecurity

The Georgia REACH program generated positive impacts on improving the self-sufficiency of program participants. Georgia REACH Cohort participants improved their performance on the Home Energy Insecurity Scale more frequently, and to a greater extent, than did the Georgia REACH control participants.

The REACH Cohort group generated "thriving" households, while the control group did not. The REACH Cohort population generated far more "capable" households than did the control group. The REACH Cohort population succeeded in removing households from their vulnerable status. The REACH Cohort population experienced a greater increase in home energy stability than did the control group. Twice as many Cohort participants as control participants experienced an improved Home Energy Insecurity status. However, even though the Georgia REACH Cohort

population removed most households from their "in-crisis" status, others Cohort households fell into crisis during the program.

The Georgia REACH program helped to ***improve*** the Home Energy Insecurity status of the program's Cohort participants even if that improvement did not move those participants completely into the "capable" or "thriving" categories. A sharp improvement was particularly found in moving Cohort participants out of the "in-crisis" and "vulnerable" categories and into more secure, more self-sufficient, Home Energy Insecurity classifications. Whether or not the program succeeded in moving Cohort participants to the ***highest*** category, it did, indeed, succeed in improving the self-sufficiency of Cohort participants.

The Georgia REACH Cohort participant population begins to approach a level of having all households, on average, rate "stable" on the aggregate index. The REACH program improvement eliminated nearly half of the gap between the beginning Home Energy Self-Sufficiency Index and an ending Home Energy Self-Sufficiency Index representing an average categorization of stable.

Energy Usage Reductions

The combination of energy efficiency interventions had a substantive impact on the energy consumption of Georgia REACH participants. The energy impact of the REACH Program was calculated for both the electric and natural gas program participants. The Georgia REACH program generated an average net reduction in electricity consumption of 835 kWh or 5.7% of the average pre-participation normalized annual consumption (when comparing Cohort and control populations). The Georgia REACH program generated a net savings of 122 therms, or 12.6% of the average pre-participation normalized annual consumption (when comparing Cohort and control populations).

Blower-Door Aided Leakage Reductions

The homes of Georgia REACH Cohort participants were universally subject to potentially significant air sealing before the blower-door-guided home energy assessment by REACH project staff. None of the pre-treatment Cohort homes were "tight" as measured by home "leakiness" metrics. One primary metric used involved Air Changes per Hour (ACH).

While the air sealing efforts ***improved*** the air tightness of Cohort participant homes, the Georgia REACH home energy assessments did not achieve the goal of making Cohort participants homes "tight" from an air leakage perspective. When viewed from the perspective of air changes per hour, the improvements generated by Project Energize in preventing air leakage moved five (5) homes from a classification as "leaky" to a classification as "moderate." All "moderate" homes, however, remained moderate, rather than being moved to the classification of being "tight." On the other end of the spectrum, nearly all of the homes that were "leaky" prior to the air sealing efforts remained classified as "leaky" after the air sealing efforts as well.

This is not to say that these homes did not experience improvement in their tightness-- in some cases substantial improvement, merely that the magnitude of the improvement was insufficient to

change the classification of the air tightness of the home. Despite the inability of Project Energize to accomplish ***all*** that it had perhaps hoped to achieve through the air sealing efforts, the project, nonetheless, generated significant ***improvements*** in the tightness of Cohort participant homes.

The Project Energize air sealing efforts generated impressive improvements in the tightness of Cohort participant homes through its blower-door guided home energy assessments. The air sealing efforts generated significant ACH reductions in 62% of the homes classified as moderately tight on the blower-door pre-tests, with 31% of those homes experiencing "substantial" ACH reduction and 31% experiencing "moderate" ACH reductions.

The Georgia REACH Cohort participant homes that were originally classified as "leaky" experienced even better results. The ACH reduction was moderate or greater in 70% of those leaky homes, with 41% experiencing a "substantial" reduction in air infiltration. The Project Energize air sealing efforts generated the greatest reductions in the leakiest homes.

Bill Reductions from CFL Installation

One of the primary reductions in energy bills accruing from the Project Energize energy efficiency interventions involved the installation of energy efficiency compact fluorescent (CFLs) in Cohort recipient homes. Project Energize staff installed CFLs at the time of the in-home energy assessment. While the number of CFLs installed was generally limited to six units per home, a few number of homes received more than this number.

Georgia REACH consumers saved, on average, between $50 and $67 each year depending on whether the CFLs installed through Project Reach replaced 75W or 100W incandescent light bulbs. Over a three year period, the Georgia REACH project generated between $150 and $200 in electric savings (assuming constant electric prices) for its Cohort participants. The installation of CFLs, standing alone, reduced the energy bills of Georgia REACH Cohort participants by significant percentages. In the scenario involving replacement of 100W light bulbs, electricity savings generated dollar savings ranging from 2% to 6% of the household's electricity bill. In the scenario involving replacement of 75W light bulbs, electricity savings generated dollar savings ranging from 2% to 12% of the household's electricity bill.

Utility Bill Payment Impacts

One key attribute of the self-sustainability of home energy within Project Energize Cohort participants is achieving an ability to make utility bill payments in a full and timely fashion. Three parameters were used to measure bill payment outcomes: (1) the completeness of payments; (2) the timeliness of payments; and (3) the regularity of payments.

The most common indicator of whether complete payment have been received from a utility customer involves measuring both the incidence and extent of arrears. The incidence of arrears considers the proportion of the total population in arrears. The extent of arrears is measured by assessing the degree to which dollars of payments each month cover the dollars of current bills. The provision of Georgia REACH services appears to substantively increase the completeness of

bill payment within the Cohort population. The net improvement in the cohort group's current bill coverage index was 15% over the first four months after the treatment. Moreover, the provision of Georgia REACH services appears to substantively reduce the incidence of arrears in the low-income population. The net change in the percentage of Cohort accounts in arrears indicates a reduction of 12% in the percentage of Cohort accounts in arrears.

The promptness of bill payment considers not merely whether a customer pays his or her utility bill in full, but whether the customer pays his or her utility bill on time on a monthly basis. If a utility renders a bill for $100, that company wants a customer to pay the bill by the due date as well as paying the bill in full. Cohort participants demonstrated a substantive net increase in the proportion of bills that resulted in a payment yielding a $0 balance in the next month. Georgia REACH cohort recipients experienced a net increase of 0.06 in the proportion of monthly payments yielding a $0 balance. In addition, Georgia REACH cohort participants experienced an improvement in the proportion of payments that equal or exceed the current bill relative to what would have been experienced in the absence of the program. While the Georgia REACH program interventions did not result in an increase in the number of payments that equal or exceed the current bill, the program resulted in an improvement in current bill payments relative to what would have been experienced in the absence of the program. The program generated a net improvement of 0.11 in the proportion of payments that equal or exceed the current bill each month.

An examination of the regularity of bill payment measures a different aspect of a customer's payment profile than does an examination of customer arrears. A customer may maintain a relatively low level of arrears by paying multiple months of bills on an infrequent basis. An examination of January arrears, for example, does not distinguish between the customer that has made his or her last twelve monthly payments on time and in full, the customer that has made $0 in payments during August through October (perhaps waiting for the annual LIHEAP benefit to pay off those arrears), and the customer who makes three payments over the year of amounts equal to the total annual bill. While the "bills behind" statistic has a regularity of payment implicit in it, the regularity of payments can be directly measured.

There was a substantive improvement in the payment-to-bill ratio for Georgia REACH Cohort participants subsequent to the receipt of a Project Energize home energy audit. The data supports a conclusion that there was a slight, but measurable, improvement in the payments-to-bills ratio for Georgia REACH cohort participants. Not only did the payment-to-bills ratio increase, but also the monthly volatility in payments-to-bills was reduced.

Overall, the Georgia REACH program interventions substantively improved the utility bill payment outcomes for the program's Cohort participants. Payment outcomes were considered for the full range of a payment profile for the REACH participants. The profile included the completeness of payment, the timeliness of payments, and the regularity of payments. While the improvement in the regularity of payments was subtler and less substantive than other payment metrics, across-the-board, Georgia REACH Cohort participants improved their utility bill payment patterns as a result of program interventions.

Energy Efficiency Knowledge from Workshop Training

In addition to generating measurable energy savings through a combination of the energy efficiency interventions discussed throughout (e.g., air sealing, appliance replacement, energy education), one of the goals of Project Energize was to raise the level of energy efficiency awareness and educational levels among the Project Energize Cohort population.

REACH participants had modest knowledge about energy use in their homes prior to attending the energy efficiency workshops. The seminar resulted in significantly improved scores. The seminar improved REACH participant knowledge to allow substantial improvements in the highest test scores. In addition, more than one-third of the incorrect responses found on the pre-test were eliminated by the Georgia REACH half-day training.

Workshop attendees showed particularly significant improvement on six of the fifteen questions designed to measure the effectiveness of the Georgia REACH energy efficiency training. The biggest improvement came in knowledge about taking showers rather than baths. The second greatest improvement came in the knowledge exhibited regarding warming a cold home. Workshop attendees correctly responded that a home does *not* heat more quickly if the thermostat is set higher (*e.g.*, 80 degrees rather than 70 degrees). The third greatest improvement came in knowledge about the benefits that households derive from lowering household utility bills. More REACH participants correctly answered on the post-test that lowering utility bills generated benefits beyond simply saving money.

Despite this improvement, some gaps in energy efficiency knowledge remained after receiving training. The most frequently *in*correctly answered question was about whether it was *false* that a toaster oven uses less energy than a microwave to cook two potatoes. Moreover, more than one-third of workshop attendees *in*correctly answered whether it was *true* that utility expenses, including the refrigerator, can be as high as the costs of heating for a typical household in the course of a year.

CONCLUSIONS AND RECOMMENDATIONS

Evaluation Questions

At the inception of Project Energize, the Georgia REACH project staff established eight "evaluation questions" which they wished to be answered by the end of the project. Given the above assessment of Project Energize, the evaluation questions are answered as follows:

- **Did the program operate as designed and intended?** Yes. The program combined energy efficiency education with energy efficiency investments with intense one-on-one case management to provide compelling energy affordability services to REACH Cohort participants. Each program component "worked." Home energy audits were performed resulting in a combination of air sealing and appliance replacement where appropriate. Household financial counseling was delivered (coupled with a limited amount of cash assistance to pay pre-existing arrears). Energy education was provided, both on an individualized one-on-one setting and in group workshop

settings. Intensive case management was provided, resulting not only in improved financial literacy, but also in referrals to appropriate additional community resources.

- **Are the interventions implemented for each individual household related to the specific risks facing that household?** Yes. A specific individualized risk assessment was performed for each Project Energize Cohort participant. Project Energize interventions were tailored not only to the specific energy needs of the households, but to the specific social and economic consequences manifesting themselves as a result of the unaffordability of home energy. Ongoing case management allowed project staff to assess not only the family needs at the entry of each Cohort participant into REACH, but throughout the Cohort participant's continuing involvement with REACH. The tailored risk responses arising from the individualized risk assessment and case management were one of the most heavily praised aspects of the Georgia REACH program.

- **Does the program result in reductions in energy consumption?** Yes. The combination of energy education, appliance replacement, and air sealing efforts resulted in measurable reductions of both natural gas and electricity consumption.

- **Does the program result in reduced energy bills (and thus improved energy burdens)?** Yes. In addition to the reduced energy bills attributable to the air sealing efforts, appliance replacement, and energy education, one particular program component leading to a reduction in electricity bills (and thus improved energy burdens) involved the replacement of incandescent light bulbs with new energy efficiency compact fluorescent light bulbs. This program component, standing alone, resulted in significant bill reductions for program participants.

- **Is there an improvement in energy efficiency knowledge?** Yes. The energy education workshops delivered by the Southface Institute through Project Energize were particularly effective in improving energy efficiency knowledge. REACH participants entered the program with a modest knowledge of energy efficiency matters. The REACH workshops substantively improved the knowledge on important ways in which households can take action to improve the energy efficiency of their home, reduce home energy bills, and improve home energy affordability. While some knowledge gaps remained after the workshops, the measured gain in energy efficiency knowledge was impressive.

- **Is there an improvement in utility bill payment patterns?** Yes. Utility bill payments patterns were measured in terms of the completeness, timeliness and regularity of utility bill payments. Substantive improvement occurred within the Cohort population for all three parameters.

- **Is there an improvement in energy self-sufficiency?** Yes. Energy self-sufficiency was measured using the Home Energy Insecurity Scale first developed for the federal LIHEAP office in 2003. The Georgia REACH project resulted in a demonstrated improvement in the number of households found to be capable and a demonstrated

reduction of those households that are vulnerable. Even for the REACH participants not moving up the Home Energy Insecurity Scale, Project Energize reduced the number of indicators that placed those households in lower insecurity thresholds.

- **Were clients satisfied with the services delivered?** Clients universally expressed not only satisfaction with, but enthusiasm for, the Georgia REACH program. The caring, professional, involved efforts of the staff were repeatedly noted as being the highlights of the project to Cohort participants. Each of these client comments provided in their respective exit interviews standing alone --and certainly the sum of the comments when considered in their totality-- support the conclusion that Project Energize accomplished one of the major objectives of the Georgia REACH program.

Early in its REACH application, the State of Georgia (and Partnership for Community Action, the administrating community action agency) said that what Project Energize was all about was to "systematically assess and identify the areas and levels of risk the family faces, assist the family in setting and working toward concrete goals, and combine supportive relationships with tangible help." It is impossible to conclude anything but that the program accomplished that objective.

Recommendations for Improvement

The Georgia REACH program operated as intended, produced the services promised, and generated the outcomes it desired. The program's overall design and operation are to be commended. Should the program be replicated in other jurisdictions, three design enhancements might be appropriate and are recommended for future REACH programs:[1]

- *First*, while REACH customers appeared to be able to make full, timely and regular payments toward their current bills, program participants appeared to continue to struggle with pre-existing arrears. While REACH participants succeeded in preventing *increased* arrears, and generated modest results in arrearage reduction, they frequently were unable to fully retire the arrears that they brought into the program. Future REACH programs should consider involving regulators with the extensive social service interventions in an effort to incorporate a modest arrearage forgiveness program through which timely current payments will be "rewarded" with credits applied against pre-existing arrears that exceed affordable levels. Through this added initiative, REACH participants that have a demonstrated ability to stay current will be able to work with a clean slate in the future.

- *Second*, while REACH staff provided an impressive range of interventions directed toward bringing the full range of community resources to bear on resolving household financial problems, the Earned Income Tax Credit (EITC) did not appear in the range of public resources accessed through the REACH program. Telephone lifeline

[1] Other specific recommendations on individual program details are included throughout the narrative discussion in the body of this evaluation. These recommendations regarding program implementation details most often address the ease of implementation rather than the appropriateness of program design.

credits, Food Stamps, the National School Lunch/Breakfast program, subsidized child care, Peachcare for Kids (health care), and the Standard Utility Allowance (for food stamps) were all accessed to provide support for communications, food, housing, and child care. While the REACH program was, by design, directed toward customers already participating in the federal fuel assistance program (LIHEAP), the program would benefit from targeting outreach for the EITC toward its payment-troubled participants. With an average benefit of more than $2,000, the EITC would provide an important additional resource to help these low-income customers meet their total winter fuel payments.

- *Third*, while REACH generated impressive results in all aspects of the program it adopted, a future program might wish to consider elevating the importance of one response to a risk that was amongst the most commonly cited. The energy education resulted in increased energy efficiency knowledge. The energy efficiency interventions (air sealing, appliance replacement) generated reductions in both natural gas and electric bills. The case management (along with other interventions) generated improved utility bill payment outcomes and improved Home Energy Security. One corollary issue frequently identified in the REACH risk assessments, however, involved both the lack of a savings account and the inability to develop personal resources to allow a cushion to use in responding to financial exigencies (either increased expenses or decreases household income). One financial exigency identified as an "increased expense" involved unexpectedly high home energy bills. Future REACH programs may wish to target not only the short-term outcome of helping participants meet their *immediate* needs in paying home energy bills (while at the same time putting food on the table), but in building household assets as well. Particularly if a REACH program were to incorporate an EITC outreach component into a future initiative, bringing REACH participants into the mainstream of financial markets, helping participants build savings, and focusing on not only the resolution of immediate income problems, but also the building of long-term household assets, can and should be incorporated into a broader program outcome.

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CHAPTER 1: INTRODUCTION

In federal fiscal year 2002, Georgia submitted the state's request for four proposed projects to the U.S. Department of Health and Human Services (DHHS) Administration for Children and Families (ACF) Office of Community Services (OCS) and received one project approval. DHR's Division of Family and Children Services (DFCS) and the community action agency Partnership for Community Action, Inc. of Decatur (GA) collaborated to submit the "Project Energize" project to assist with addressing the need for reducing the energy burdens of low-income families, increasing the regularity of energy payments, increasing energy supplier contributions to the reduction of household energy burdens, and providing energy conservation tips and household budgeting education to low income families. "Project Energize" was selected as a recipient of a FY02 Residential Energy Assistance Challenge (REACH) award.

TARGET POPULATIONS

Project Energize was designed to target a specific segment of the LIHEAP client base. Georgia chose to focus on single-parent, female-headed DeKalb County households with children. Additional project eligibility criteria included living at the current residence for at least 12 months and not expecting to move within the next 12 months. Program outreach was targeted to families that have at least some income from wages

PROGRAM SERVICES

Project Energize was designed to address some of the systemic barriers to energy self-sufficiency and to help families identify areas in which knowledge and behavioral changes would make a difference to long-term energy burden and payments. Project Energize provided an array of services to the 300 households that it intended to bring through the program. Included within that array of services were the following:

- Energy efficiency workshops;
- Mediation with energy providers to reduce arrearages and establish reasonable payment plans;
- Modified "weatherization" of housing units;
- Counseling in financial literacy and manageable budgeting;
- Referrals to community resources to serve as "effective bridges to outside services"; and
- Connecting families to "other services that can make a difference in their disposable income."

Project Energize was designed to provide "high intensity services" that "systematically assess and identify the areas and levels of risk the family faces, assist the family in setting and working toward concrete goals, and combine supportive relationships with tangible help."

PROGRAM OBJECTIVES

The basic hypothesis of the Georgia REACH project was set forth in Georgia's application for REACH funding:

> The barriers to self-sufficiency. . .are for the most part, systemic--not personal--barriers. No REACH project can substantially affect income and asset disparities, lack of affordable housing, limited access to living-wage employment, or utility deregulation legislation. What Project Energize Can do is to. . .provid[e] tangible, concrete benefits that address some of the systemic barriers (air sealing to reduce energy consumption in substandard housing; partial arrearage payments to lessen the effects of deregulation-caused gas prices), and second, helping families identify areas in which new knowledge and personal behavioral changes *will* (emphasis in original) make a difference to long-term energy burden and payments.
>
> The central hypothesis of Project Energize is that, for participants who complete an Energy Efficiency Education workshop series, are provided with home weatherization measures, and work for six months with a supportive Energy Advocate, we can moderately reduce the energy burden, meaningfully reduce arrearages, improve the comfort, indoor air quality, safety, and security of housing, and significantly increase both the ability to pay and timely payment of utility costs for 300 families. . .

The measurable outcomes that Project Energize hypothesized at the beginning of the program included:

- Project participants gain increased knowledge about energy use and budgeting;
- Arrearages are immediately reduced and affordable payment plans are designed;
- Project participants are provided "some means by which to reduce energy consumption";
- Participants make measurable progress toward addressing the barriers to energy self-sufficiency;
- Weatherization measures reduce participant usage (and costs).

From a program perspective, Project Energize hypothesized that by the end of the program, we "expect to learn a great deal about which interventions are most--and least-- helpful to which families."

EVALUATION QUESTIONS

Given this overview of Project Energize, the evaluation questions to be addressed in the narrative below include the following:

- Did the program operate as designed and intended?
- Are the interventions implemented for each individual household related to the specific risks facing that household?
- Does the program result in reductions in energy consumption?
- Does the program result in reduced energy bills (and thus improved energy burdens)?
- Is there an improvement in energy efficiency knowledge?
- Is there an improvement in utility bill payment patterns?
- Is there an improvement in energy self-sufficiency?
- Were clients satisfied with the services delivered?

SUMMARY AND CONCLUSIONS

Project Energize is designed to improve the energy self-sufficiency of participating Cohort households. To accomplish this move toward self-sufficiency, an array of interventions were provided to REACH Cohort participants. Not all of these interventions, however, were provided to all participants. Instead, the REACH project was designed to identify household-specific barriers to self-sufficiency and to implement specific interventions designed to overcome each of these specific barriers.

The goal of "energy self-sufficiency" is a difficult concept to define, let alone to operationalize, through a program such as REACH. Given the delivery of Project Energize services, it is reasonable to expect that energy usage (and thus bills) will be reduced, home energy burdens will be made more affordable, usage will be brought more within the conscious control of individual households, and self-sufficiency will be enhanced.

CHAPTER 2: PROGRAM SERVICES PROVIDED

The Georgia REACH project was based on a model of intensive individual interventions. While somewhat more expensive than a broader-based delivery of affordability services, the Georgia REACH model was based on the hypothesis that program effectiveness would be enhanced by devoting the time and resources to assessing individual family needs, crafting individual responses, and delivering individual services. The services provided by Project Energize can be categorized into three broad areas:

- Individualized education;
- Energy efficiency investments; and
- Extended personalized assistance.

INDIVIDUALIZED EDUCATION

The individualized education provided by Project Energize involved working with each Cohort participant family to deliver education on household finances and energy use in the home. The individualized education was based primarily on the "homework" that each Cohort participant was required to prepare as part of the REACH application process. This homework involved preparing an estimate of family income and expenses, by category.

Individualized Energy Efficiency Training

One key activity in the delivery of energy efficiency services to Georgia REACH participants was the delivery of energy education. Energy education was provided in two different forms. First, at the time Project Energize weatherization staff were undertaking the home energy assessment, a Project Energize family advocate met one-on-one with the program participant. This individualized training focused on how energy was consumed within the home, what the major uses of energy were in the home, what costs specific individual uses imposed upon the household, and how the household might reduce specifically-identified energy uses in an effort to control the impact of energy bills on the household budget. Using a standardized worksheet with individual end-uses identified, Project Energize staff filled in daily consumption and price data and then estimated the daily and monthly costs of energy uses such as lighting, television, hot water for bathing, cooking, dishwashing, and other daily activities.[2]

In addition to usage and cost estimates, information was imparted to teach households how to read their natural gas, electric and water meters. Education was provided on how to understand the information that is provided on each monthly utility bill.

[2] One common finding was that households erroneously believed that one of the primary uses of energy in the home involved the television set and that, if television usage were better controlled, substantial energy savings would be experienced. Most households did not recognize the refrigerator as a primary user of electric energy. Virtually no household knew how to calculate the financial savings that would arise from substituting CFLs for existing light bulbs.

In addition to the family education provided at the time of the in-home energy assessment, the in-home energy assessment involved doing a walk-through of the home to identify places where the home might be wasting energy. Leaky faucets and toilets were repaired on the spot. High-use light bulbs were replaced with compact fluorescent bulbs. Faucet aerators and low-flow showerheads were installed during the walk-through.

Individualized Budget Counseling

At the time of the in-home energy assessment, the Project Energize family advocate worked with family members to identify historical spending patterns and to prepare a future family budget. At the time of program intake, each Cohort participant was provided a "budget diary." Through this diary, the participant tracked each expenditure ("major" and "minor") made by the household.[3] Cohort participants commented on how the budget diary identified a host of "miscellaneous" expenditures that occurred on a day-to-day basis that were individually small enough to not be noticed, but cumulatively substantial enough to have an impact on total household spending.

Household expenditures were classified and tracked by the following categories: tithes, utility expenditures (electric, water, sanitation, telephone, natural gas), housing (rent/mortgage, insurance, taxes, maintenance), food, transportation (auto, public transit, maintenance, insurance, fuel/oil), insurance, debt, clothing, savings, entertainment, medical, miscellaneous, school/children, and laundry/cleaning.

At the time of the budget counseling session, each category of expenditures was reviewed to determine both whether there was room for savings and whether there were additional resources that might be brought to bear on helping the household pay these expenditures.

During these home energy assessment budget counseling sessions, the family advocate identified the potential for referrals to programs that might provide additional resources to the family. These included programs such as Peachcare for Kids (medical insurance), telephone lifeline assistance, Food Stamps (food), standard utility allowances (SUA) (shelter costs), pharmaceutical assistance (medical), free and reduced school meals (food), and a variety of other public assistance programs. Assistance with making applications for such assistance was subsequently provided through the extended assistance component of the Project Energize program.

Finally, family advocates discussed household income during these budget counseling sessions. Referrals to non-REACH programs offered by Partnership for Community Action (PCA), the community action agency sponsoring REACH, were made for initiatives such as job skill development, micro-enterprise training for self-employed workers, and GED certificate completion (education).

[3] The diary was part of what was known within Project Energize as a Cohort participant's "homework." The homework consisted not only of preparing the diary, but also efforts taken by the Cohort participant to develop a household budget and to identify the primary uses of energy in the home.

The specific training that was provided was guided by the risk assessment performed for each Cohort household by the family advocates. This risk assessment process is discussed in more detail below.

Arrearage Payments/Utility Deferred Payment Plans

Project Energize devoted a limited amount of program funding to the payment of pre-existing utility arrearages in order to allow Cohort participants to free themselves of arrears that would make future bill payments unaffordable, even given usage and bill reductions attributable to the energy efficiency interventions directed toward the households. REACH family advocates helped 39 Cohort participant households negotiate deferred payment plans for pre-existing arrears.[4] The purpose of negotiating payment plans was not only to address the underlying arrears, but also to free the household from paying ongoing late payment charges imposed on arrears carried by a utility account that had not been made subject to agreement.

In addition to helping negotiate payment plans, REACH made a limited number of cash payments toward arrears. Within the Georgia REACH Cohort population, 204 households owed a cumulative arrearage of $54,200 when they entered the program. REACH made payments toward the arrears of 177 of those Cohort participants with arrears, with payments reaching a total of $27,500. The discussion below is limited to those Cohort participants receiving payments.

There was a wide range of pre-existing arrears. Of the Cohort participants owing arrears, the number of households owing more than $500 out-numbered the number of households owing less than $100. More than 50 REACH Cohort participants owed more than $300 on their utility bills before receiving REACH arrearage assistance.

Pre-Existing Utility Arrears Entering Georgia REACH Program Before and After REACH Arrears Payment

	Number of Cohort Participants Receiving REACH Arrears Payments	
Level of Arrears	Before REACH Payment	After REACH Payment
$0	---	56
$1 - $100	14	50
$101 - $200	59	31
$201 - $300	50	17
$301 - $400	24	12
$401 - $500	13	3
$501 or more	17	8
Total	177	177

[4] This is not to say that only 39 REACH Cohort participants negotiated payment plans. Only 39 REACH Cohort participants were reported to have received the assistance of REACH family advocate staff in negotiating deferred payment plans.

REACH would generally pay up to a maximum of $150 toward helping Cohort participants retire their arrears. In only 34 instances were payments of more than $150 made. With 56 of these arrearage payments, the entire arrears was retired (leaving a balance of $0). After the REACH payments were made, only 40 Cohort participants owed more than $200 (down from 104), while only 11 owed more than $400 (down from 30).

Energy Efficiency Workshop Training

A less individualized, but nonetheless major source of energy efficiency training was provided through a formal group workshop presented by Southface Institute, one of the region's leading energy efficiency nonprofit organizations.[5] REACH participants were "required"[6] to attend a half-day workshop. Workshops were scheduled so that they were convenient to working persons; child-care was provided. The workshop was designed to educate attendees about energy use in their homes and to inform attendees on simple ways in which energy-using behaviors could be modified so as to reduce consumption and thus bills. The objective of the seminar was to provide REACH participants with the opportunity to gain greater knowledge so as to enable them to exert greater control over energy bills placing burdens on household incomes.

The energy efficiency curriculum delivered through REACH's Southface workshops focused on the following themes:

- **What affects utility bills.** Southface told workshop attendees that factors affecting utility bills included how you live in the house; what utility rates you pay; and what improvements are made to improve energy efficiency.

- **How energy is used in the home.** Southface told workshop attendees that, in a typical home in Atlanta (GA), only 25% of a home energy bill is attributable to home heating. In addition, 18% of a bill comes from hot water, while 41% of a home's energy bill is attributable to electric usage, including appliances (21%), lighting (10%), and refrigeration (10%).

- **Energy savings strategies.** Southface told workshops that it was a "myth" that adding insulation was the *only* way to improve energy efficiency in the home. According to Southface trainers, 40% of energy used in the heating season is for air leakage, while 27% of energy used in the cooling season is lost to air leakage.

- **Energy savings activities.** Southface provided energy saving tips to workshop attendees, including repairing faucet leaks (could save $39 a year), taking showers rather than baths, using "soaker hoses" rather than sprinklers for watering plants outdoors (could save $33 a year), using compact fluorescent light bulbs (could save up to $50 each), washing clothes in cold water, and using a microwave oven for

[5] The Southface website can be viewed at http://www.southface.org.
[6] The Georgia REACH project was not universally successful in getting REACH program participants to attend the energy efficiency workshops. Of the 270 REACH participants, 179 attended one of the half-day events. REACH participants who attended the workshop were provided a $50 stipend.

cooking small amounts of food (for one potato, a toaster oven uses three times more electricity than a microwave).

- **Reading meters:** Southface provided information on how to read meters (electric meters are easier to read than natural gas meters, according to the trainers).

- **Appliance replacement.** Southface provided information on when it makes financial sense to replace air conditioners, old refrigerators and old washing machines.

Southface emphasized to workshop attendees that "most measures and improvements we have discussed you can accomplish yourself." By undertaking these energy efficiency steps, Southface said, "you will be able to reduce your utility costs and save dollars."

Southface Institute presented REACH efficiency workshops on ten dates. The seminars were presented in interactive small group sessions. Each seminar lasted roughly one-half day.

ENERGY EFFICIENCY INVESTMENTS

The Georgia REACH program invested considerable dollars in infrastructure improvements to the homes of Cohort participants in addition to providing energy education. The efficiency improvements came in the form of air sealing efforts (and the installation of other low-cost conservation measures) at the time of the home energy assessment. In addition, some major appliance replacement was funded.

Air Sealing

One major aspect of the Project Energize home energy assessment involved blower-door aided air sealing designed to reduce energy consumption (and thus energy bills). At the same time family advocates were meeting with household members to discuss energy education and family budget issues, a Project Energize crew was performing air sealing work. Pre- and post-air-sealing blower door readings were recorded to determine the extent to which the air sealing efforts reduced the air leakage in and out of the home. The air sealing effort involved:[7]

- Installing caulking in 110 homes;

- Providing foam in 67 homes;

- Providing weather-stripping in 119 homes;

- Providing door sweeps in 86 homes;

- Providing pipe insulation in 175 homes;

[7] A variety of low-income energy conservation measures are included within the rubric of "air sealing." Measures such as aerators, low-flow shower heads, water heating jackets, furnace filters and pipe insulation obviously are not "air sealing" measures, but are included in this discussion nonetheless.

- Installing heat jackets in 181 homes;
- Providing outlet seals in 107 homes;
- Providing switch seals in 84 homes;
- Providing furnace filters in 28 homes; and
- Providing insulation board in 64 homes.

Low flow showerheads were installed in 146 homes, and faucet aerators were installed in 130 homes.

The most commonly installed efficiency measure involved compact fluorescent lightbulbs. Nearly 2,800 CFLs were installed in more than 210 homes.

In addition to the energy conservation measures, the in-home energy assessment identified health and safety issues. These issues were addressed by providing smoke alarms in 97 homes, carbon monoxide detectors in 110 homes, and fire extinguishers in 111 homes.

Appliance Replacement

In addition to the low cost energy conservation measures commonly installed at the time of the in-home energy assessment, the energy assessment also identified extraordinary cases where replacement of major appliances was merited on either economic or on health and safety grounds. This major appliance replacement program component resulted in:

- Furnace replacements for 28 homes;
- Refrigerator replacements in 52 homes;
- Natural gas stove replacements in 24 homes;
- Electric stove replacements in 16 homes;
- Wall oven replacements in 7 homes;
- Cook top replacements in 7 homes;
- Slide-in/pop-in kitchen range replacements in 3 homes;
- Air conditioner replacements in 9 homes; and
- Water heater replacements in 11 homes.

EXTENDED PERSONALIZED ASSISTANCE

The Georgia REACH program was designed to provide ongoing personalized attention to Cohort participants over the six month period of program participation. During this time period, Project Energize family advocates made periodic contact with the Cohort participants to assess whether the households were succeeding in the household budget and spending plans they had developed in collaboration with the family advocate, whether questions had arisen about energy usage or energy savings issues, or whether some other type of family crisis (*e.g.*, loss of job) had arisen that might benefit from outside intervention.

The extended personalized assistance was driven in part by the Risk Assessment Matrix prepared for each household by the REACH family advocates as well. The Risk Assessment Matrix is explained in greater detail below.

Since the Georgia REACH program was targeted to single parent households, one area of particular extended personalized assistance involved helping parents address child-related household expenses. One common intervention was to use the *Thrifty Parenting* training module developed by Oregon State Extension Service to help address child-related expenses. The *Thrifty Parenting* program is designed for families with young children. It shows ways that parents can cut the expense of raising children, while maintaining health and safety standards. Topics included in the *Thrifty Parenting* training include food and health care; clothing; and equipment, toys, and entertainment. According to the risk assessment matrices prepared by family advocates, the *Thrifty Parenting* training was used in personalized training with 62 Cohort participants.

Providing assistance on applying for free and reduced school meals was a second personalized service that was commonly provided. One concern frequently expressed to REACH family advocates involved the impact that paying unaffordable home energy bills had on the family's ability to put food on the table for the children. REACH family advocates reported helping 50 different households apply for free and reduced price school meals in response to these concerns about "kid-related food expenses."

Working on developing a savings plan was a common intervention as well. One common risk that was identified by Project Energize family advocates was not only the "lack of savings," but also the inability to respond to financial emergencies (either on the income side, such as loss of job or reduction in hours, or on the expense side such as unexpectedly high home winter heating bills). Family advocates reported working with 91 REACH Cohort participant families to develop a savings plan. In 22 of those instances, family advocates helped the Cohort participant family establish a low-cost/no-cost "lifeline" banking account.

Other less common interventions included:

- Help in finding a less expensive apartment in response to high housing costs (provided to 3 Cohort participants);
- Help in applying for subsidized child care (provided to 5 Cohort participants); and

- Help in preparing a debt retirement plan (for debts other than the utility arrears that were addressed above) (provided to 7 Cohort participants);

The impact of these extended services is evident from the responses of REACH Cohort participants reported in the program exit interviews discussed in the outcome section below.

SUMMARY OF SERVICES

Projects Energize provided an array of intensive personalized services in helping REACH Cohort participants seek energy self-sufficiency. The services ranged from personal in-home assistance with budget counseling and energy education, to group energy education, to investment in the physical infrastructure of the home (both in air sealing and appliance replacement). In addition, Project Energize provided individualized financial and counseling services to address utility bill payment problems and the factors that contribute to those problems. Not only did REACH provide limited payments toward pre-program arrearages, but REACH family advocates worked with each family to identify specific risks facing those families and developing individualized interventions to help address those risks. Given this array of services, this evaluation will address whether REACH succeeded in generating the outcomes it posited for the program upon the program's inception.

Before turning to the outcome evaluation, however, the next section will first examine the internal operation and processes of the program.

CHAPTER 3: PROCESS EVALUATION

This section presents a process evaluation of the Project Energize program. This process evaluation is directed toward three narrow questions:

- Was the project implemented in an appropriate and timely fashion and as proposed?
- Did the project comply with the broad parameters of the "logic model" of problem identification and intervention, the implementation of which lies at the heart of the REACH process?
- Was the overall design appropriate, given what was learned during the course of the project?

This section is *not* designed to consider the effectiveness of the Georgia REACH efforts in achieving its goals.

This process evaluation is based on four lines of inquiry:

1. Personal interviews were performed with several sets of staff, including: (1) the project management responsible for implementation of the program as a whole; and (2) field personnel responsible for actual client contact and service delivery.

2. A series of project staff meetings was attended. Project staff meetings were held on a monthly basis to discuss project activity and to engage in problem-solving. Attendance at project staff meetings was designed to observe actual project implementation.

3. Program documentation was collected and reviewed, including training materials, forms, the staff manual, and staff work product.

4. Finally, written staff work products were reviewed from each field staff with respect to Project Energize participants. Part of this review involved reviewing the complete client files maintained for each Project Energize Cohort and control participant at the end of the program. Staff work products included items such as the in-home energy assessment reports, the in-home financial counseling reports, staff intake interview forms, and the risk assessment matrices prepared by staff.

The discussion, conclusions and recommendations below are based upon the interviews, personal observations, and document review.

OVERALL PROJECT ENERGIZE PROCESS

The overall Project Energize Process consisted of four basic steps, each of which is described below. Outreach and enrollment was the first step. The second step involved an initial interview

and discussion of household finances. The third step involved the delivery of an in-home energy assessment. Finally, the fourth step involved maintaining ongoing contact between the Project Energize family advocates and each of the Cohort participants.

Outreach

Outreach for Project Energize was focused almost exclusively on households that submitted applications for energy assistance through the federal Low-Income Home Energy Assistance Program (LIHEAP). During the LIHEAP program year, REACH staff would review every LIHEAP application taken by Partnership for Community Action (PCA), the community action agency administering REACH, to screen those households against REACH program eligibility criteria. According to REACH staff, using the LIHEAP application process facilitated the REACH outreach activities since project staff were assured that the household would be income eligible. Nonetheless, other REACH program criteria included whether the household had children as well as whether the household had lived in the same home for at least twelve (12) months. That criterion, standing alone, proved to be a severely limiting factor. The residency requirement:

- Eliminated roughly 50% of the persons who lived in rental units that had applied for LIHEAP assistance; and

- Eliminated roughly 25% of the persons who lived in homeownership units.

Once the REACH program eligibility was determined (on a preliminary basis), REACH program staff would randomly select LIHEAP applicants surviving the screens to 100 households inviting REACH participation as a control participant as well as to 100 households inviting REACH participation as a Cohort participant.

In addition to these direct solicitation efforts, Project Energize circulated program flyers along with LIHEAP applications. The messages on these flyers, according to program staff, were particularly effective. The flyers outlined the benefits of REACH program participation. For control participants, the "cash was important." REACH control participants were provided a $50 check upon completing all aspects of their participation. For Cohort participants, the flyers emphasized the possibility that REACH would help pay arrears, the potential that appliances would be replaced, and the likely savings that would result from the home energy audit performed for each Cohort participant's home. Outside of program participation, however, no incentive was provided for LIHEAP recipients to respond to either the letter or to the flyers.

REACH program staff reported that they would recommend no changes to the recruitment process. To the extent that changes would improve the recruitment process, staff indicated, those changes would involve making eligibility guidelines "a little broader." The biggest barriers to recruitment involved the requirements that households have children in addition to documenting a minimum length of residency at the client's current place of residence.

Intake/Enrollment and First In-Home Visit

After a household responded to a program participation solicitation, potential REACH participants would contact the REACH office by telephone. This intake process involved an initial interview to confirm income eligibility and to confirm that the household complied with other program requirements. Program staff noted that "we interviewed a lot more folks than we enrolled." This initial interview eliminated a large number of potential participants, primarily on the basis that there were no children in the family.

The intake process differed based upon whether the family had been invited to participate in REACH as a control participant or as a Cohort participant. The intake process for control participants was accomplished almost exclusively by telephone. Potential participants would contact the REACH office. During that first telephone interview, eligibility was confirmed and the first Home Energy Insecurity Survey was administered. In addition to collecting this basic household information, certain paperwork was required to be collected. Among this paperwork was a signed release form authorizing Project Energize to contact the control participant's natural gas and electric utilities and authorizing the utility to release billing and payment data to PCA over a three year period to be used in the Project Energize final evaluation. Signed release forms could be dropped off in-person at the PCA office or could be FAXed to PCA. Utilities did not require an original signed signature in the release form provided to them.

Upon receipt of a signed release form, Project Energize would mail the control participant a check for $50.

In contrast to the intake for the control participants, Cohort participants would only have a preliminary income-eligibility confirmed in their initial telephone contact with Project Energize staff. Upon conclusion of that initial telephone interview, the Project Energize staff would then schedule an in-office appointment with the Cohort participant. The Cohort participant would be required to come to the office for an in-person interview, bringing with them documentation of income.

The in-person interview for Cohort participants sought to accomplish several objectives in addition to income verification. The first Home Energy Insecurity Survey was administered at this time to create a base line against which to measure subsequent changes, if any, in energy self-sufficiency. Just as importantly, the interview included an initial conversation about household finances.

According to the family advocate staff, the attempt to have a conversation about household finances, and household budgeting in particular, was "not well received" at the time of the initial interview. The household money management activities involved four distinct steps with the Cohort participant household:

- At the initial intake interview, staff asked about household budgeting and money management. The staff then distributed the household's "homework" to be discussed at a future in-home visit.

- The homework consisted of keeping a daily "money diary" for a full month. In this diary, the household logged all expenditures, major and minor. While most households did not understand or appreciate the roll of the diary at the time of the initial office intake interview, according to the family advocacy staff, as the time went on, the household grew to appreciate the function of the diary in tracking money leaks.

- After one month, the household sat down with a family advocate to review the money diary in detail during an in-home visit. The family advocacy staff reported that going into the home was a critical component to this step. Going into the home, staff reported, made the process "more personal." Going into the home "allowed people to share." They "felt more comfortable" talking about their personal finances as they sat in their own homes, and felt "more free to talk."

- Finally, at the time of this in-home review, the staff and household developed, and committed to paper,[8] a household budget and money management plan for the household. In subsequent contacts, the ability of the household to comply with their money management plan was reviewed on an ongoing basis. "Some people wanted to call every month to talk about their [success or shortcoming] with their money management plan," reported one family advocate.

The financial education inherent in this Project Energize process was a key element of the REACH program. One family advocate likened it to the following three-step process:

- The first step involved the family ***guessing*** at what its monthly expenditures and family budget was.

- The second step involved documenting their ***real*** expenditures, by tracking, and recording, actual household expenditures as they occurred.

- The third step involved taking control of their expenditures, by prioritizing the expenditures, creating a money management plan and seeking to adhere to it, with an ongoing after-the-fact review of compliance or non-compliance.

As documented in the discussion regarding client reactions expressed in the exit interviews, this process of involvement with the Cohort participant households was one of the most acclaimed program components of the Georgia REACH program.

In-Home Energy Assessment

One of the primary energy efficiency interventions offered by Project Energize involved the "home energy assessment" performed on the home of each Cohort participant. The home energy assessment occurred in three steps:

[8] Staff reported that committing the budget to paper was as important as developing the budget. Households appeared to take more ownership in a written budget that was memorialized in some semi-formal fashion rather than simply orally agreed to.

- A one-on-one conversation with each participant exploring how energy was consumed in the home, including the appliances used, the household's energy consuming behavior, and the household's energy efficiency habits;[9]

- A walkthrough of the home to identify places where significant home energy waste might be occurring (along with the distribution of low-income efficiency devices such as light bulbs, faucet aerators, and plug caps as appropriate);[10] and

- A blower-door-guided air sealing effort directed toward identifying and correcting places in each home where air leakage would let warm air out (or cold air in).

The blower-door-guided air sealing in particular presented the opportunity to substantially lower energy consumption and, accordingly, improved energy affordability. Every cubic foot of heated air that escapes during cold weather (or cooled air escaping during hot weather) represented an amount of air that would need to be heated (or cooled) again.

The blower-door energy audit, in turn, consisted of three steps:

- Obtaining a pre-air-sealing reading of the leakiness of each Cohort participant's home. After measuring an air flow in each home (in Cubic Feet per Minute--CFM), the home energy assessor then ***calculated*** the air changes per hour (ACH) for the home using the following formula:

  $$ACH_{50\ Pascal} = [air\ flow_{50\ Pascal} \times 60\ minutes\ per\ hour] / volume\ of\ home$$

- After using the blower door to depressurize each home, the Project Energize energy assessment crew identified and sealed the openings through which the home was losing significant energy to the outside; and

- A final post-sealing air flow reading (in CFM) was generated using the blower door and a post-sealing ACH was calculated. The difference between the pre-sealing ACH and the post-sealing ACH represented the energy efficiency improvement generated in the home for the REACH Cohort participant.

Using a constant to reflect the orientation and type of home, the REACH home energy assessment crew also calculated a pre- and post-sealing "natural" air infiltration rate. For purposes of this discussion, this calculated value will be referred to as the Estimated Natural Infiltration Rate (ENIR). In short, the three measures generated or calculated in the Georgia REACH air-sealing efforts included:

- The cubic feet per minute (CFM), which measures the flow at a designed pressure (50 Pascal);

[9] The one-on-one education is described in more detail in Chapter 2.
[10] The one-on-one home energy assessment walk-through was described in more detail in Chapter 2.

- The air changes per hour (ACH), which converts the CFM for each home to a measure taking into account the size of the home (again, at a designated pressure of 50 Pascals);[11] and

- The Estimated Natural Infiltration Rate (ENIR), which accounts for housing type and orientation.

No major problems existed with the blower-door aided in-home energy assessment. A home energy assessment crew of two persons worked on providing the blower-door audit, and air sealing efforts, at the same time that the Project Energize family advocate was meeting with family members to discuss household finances.

The only place where the audit process broke down, to a certain extent, involved the impact on family advocates from scheduling and implementing the audit. The audit team, and thus the family advocate, accordingly was "in the field" three days a week. Family advocates noted that the process of extensively being scheduled out-of-the-office frequently interfered with the ability to perform office work. Rather than being in the office to respond to telephone calls from existing Cohort participants, or to work with the intake of potential Cohort participants, family advocates instead had to respond to messages with "call-backs" that were difficult to complete. Moreover, the "one-day in/next-day out" routine frequently interrupted the continuity of service provision necessary to respond to client needs. Family advocates recommended that any future project divorce the delivery of the in-home energy audit from the in-home personal consultations.

Ongoing Client Contact

Over the six month period of Cohort household participation in the Georgia REACH program, REACH family advocates continued to maintain contact with, and monitor, the progress of Cohort participants. The objective of these contacts was several-fold. First, there was a somewhat subjective objective of "maintaining a presence" in the life of the family. This objective was in furtherance of additional goals of trouble-shooting in case extraordinary or unexpected circumstances arose with respect to either household expenses or income. A second objective was to monitor the household's progress in complying with its individualized household money management plan. In those circumstances where non-compliance was found, the family advocate discussed the plan with the household to determine whether the plan was realistic or whether the household could, with additional time, live within the plan.

One family advocate noted that one struggle with the ongoing contact was to ensure that the advocate maintained a working relationship with the family unit, and not simply with a single adult within the family. Another family advocate emphasized the need to empathize with the family and not merely prescribe staff-directed solutions. The family advocacy staff was provided specific training on developing these people skills. In addition, the family advocacy staff noted that each of them, as part of their training, was required to do every activity they would later ask the client to do. This included keeping a money diary, discussing that diary with a fellow

[11] ACH refers to the number of times in one hour that the inside air volume is replaced with outside air at a designated house pressure difference.

staffmember, and seeking to maintain compliance with the ensuing money management plan. Through such training, the staff sought to break down the barriers created by common participant beliefs that "you don't know what you're really asking."

The role of the family advocacy staff in the ongoing contact was to "broaden the vision of what could be done" in response to family circumstances. Staff reported finding that, frequently, "clients had no idea of what they could do on their own." Solutions to household issues, the family advocacy staff reported, were frequently discovered to be "not as complex as they thought." One advocate reported that her most frequently repeated phrase in her ongoing contacts with the Cohort population presented the question: "what can we do about that?"

The entire family advocate staff reported the impacts of performing in-home work with Cohort participants on the ability to accomplish work at the office. Staff work patterns ultimately worked out to include having family advocate staff in the field doing in-home visits three days a week, while being in the office doing intake interviews and telephone contacts on the other two days. One family advocate reported that the constant problem-solving "became somewhat overwhelming." One family advocate reported that she "got burned out." One family advocate reported that between field work keeping her out of the office, and intake work that often filled her office time, she felt that she did not have adequate time to appropriately respond to telephone contacts by her clients. No resulting problems could be specifically identified, however.

TWO CRITICAL PROCESSES

Risk Assessment-Driven Household Interventions

One of the primary emphases of the Georgia REACH project involved holistically addressing the energy unaffordability problems facing REACH participants. The Home Energy Insecurity Scale administered to both REACH Cohort and REACH control participants documented how the adverse social and economic impacts of unaffordable home energy bills ramify throughout a household's well-being. Unaffordable home energy bills, even if paid, can *manifest* themselves as health care, food insecurity, housing, or other problems.

Consider that 501 Georgia REACH participants (Cohort and Control combined) completed the first Home Energy Insecurity Survey administered through REACH. Of those 501 households:

- 298 said they frequently "worried whether my home energy bill would become overdue before I could get money to pay it," while only 15 said they "never" did.
- 124 said they often had their "home energy bill become due, "and I didn't have money to pay it without somebody's help" while only 82 said they "never" did.
- 189 said their household frequently "reduced our energy consumption to uncomfortable or inconvenient levels because I was running out of money to pay our home energy bill," while only 76 said they never did.

- 164 said their household frequently reduced "your expenses for what you consider to be basic household necessities because there was not enough money to pay for these and to pay your home energy bill," while only 39 said they "never" did.

To respond to energy unaffordability problems exclusively as an "energy" problem --such responses might include not only credit and collections actions such as utility shutoffs, but responses such as payment plans and levelized budget billing plans -- would be to ignore many of the tools available to mitigate the adverse impacts of unaffordable home energy bills. Instead of adopting the narrow vision of energy affordability being a bill payment problem, the Georgia REACH program responses were designed to help REACH participants avoid the transmogrification of their energy problems into other social and economic problems that might reasonably be expected to impede a household reaching for self-sufficiency.

The Georgia REACH project, as part of its holistic approach to helping clients address their home energy affordability problems (and those other self-sufficiency issues that appertain to home energy unaffordability), engaged a Risk Assessment Matrix. This Matrix allowed the REACH family advocates to identify a full range of issues arising as a result of home energy unaffordability. The family advocates could then not only address the energy issues through energy-specific interventions, but also address the corollary issues to enhance the effectiveness of the energy interventions.

The table below sets forth the energy corollaries that were most commonly identified by the REACH family advocates within the Georgia REACH Cohort population.

Georgia REACH Cohort Participants with Identified Energy-Related Household Risks	
Risks[12]	No. of Cohort Participants for which Risk Identified /a/
Carries utility arrears and pays late payment charges	41
Experiences high winter bill burdens	103
Home never weatherized	83
Income is inadequate	220
Lack of control over expenses	55
No savings and inability to respond to exigencies /b/	109
Old and inefficient appliances	31

NOTES

/a/ Individual Cohort participants may have had more than one identified energy risk and thus may appear more than once in these figures.

/b/ A separate but related risk was that the household had "no bank account and no place to cash a check or keep money." (n=5)

As can be seen, by far the most commonly identified risk was simply that the household's income was insufficient. The inability to address financial exigencies also was a commonly

[12] Similar risks have been collapsed into more generalized categories for reporting purposes in this evaluation.

identified risk. Indeed, the inability to respond to exigencies due to a lack of savings, as well as the inability to afford high winter bill burdens (an exigency unto itself), were the most commonly identified risks aside from inadequate income. The lack of control over expenses is a type of acknowledgment of the inability to handle unexpected (or unexpectedly high) household expenses.

In addition to the energy-specific risks identified by Georgia REACH advocates, there were a series of non-energy specific risks that Georgia REACH advocates identified for REACH Cohort participants as well.

- Kid-related food expenses (n=112)
- Limited marketable work skills (n=39)
- Employment related/under- or unemployed (n=34)
- Credit card expenses/old bills (n=9)
- Child care expenses (n=5)

Clearly, of these non-energy risks, those associated with employment (or the lack thereof) and children predominated. Housing and credit-related expenses, along with childcare, fell *far* behind ""kid-related food expenses" as a financial risk facing Georgia REACH Cohort participants.

Risks by Poverty Level and Income Deficit.

The pattern of energy and corollary risks between Georgia REACH Cohort participants differed markedly as between their Poverty Levels and income deficits. The REACH Cohort participants were classified into four different Poverty Levels.[13]

- Category 1 (income between 0 and 50% of Federal Poverty Level)
- Category 2 (income between 51 and 100% of Federal Poverty Level)
- Category 3 (income between 101 and 150% of Federal Poverty Level)
- Category 4 (income over 150% of Federal Poverty Level.

In addition, each Cohort participant was categorized by one of four "income deficits." The "income deficit" is simply the annual dollar amount by which reported household expenses exceeded annual gross household income. The four possible categories of income deficits included:

[13] The generally accepted measure of "being poor" in the United States today indexes a household's income to the "Federal Poverty Level" published each year by the U.S. Department of Health and Human Services (HHS). The Poverty Level looks at income in relation to household size. This measure recognizes that a three-person household with an annual income of $6,000 is, in fact, "poorer" than a two-person household with an annual income of $6,000. The federal government establishes a uniform "Poverty Level" for the 48 contiguous states. Since 100 percent of Poverty Level is generally considered to be too low to be a reasonable demarcation of "being poor," other estimates range from 150 to 200 percent of Poverty or more. A household's "level of Poverty" refers to the ratio of that household's income to the Federal Poverty Level. For example, the year 2005 Poverty Level for a two-person household was $12,830. A two-person household with an income of $6,415 would thus be living at 50% of Poverty. A two-person household with an income of $19,245 is said to be living at 150% of Poverty.

- None (reported annual income exceeded annual expenses)
- Slight deficit (expenses exceeded income by between $1 and $500)
- Moderate deficit (expenses exceeded income by between $501 and $2,500)
- Substantial deficit (expenses exceeded income by more than $2,500)

As could be expected, households with incomes at lower Poverty Levels were more likely to have more substantial income deficits. While 81% of the Georgia REACH Cohort participants with incomes below 50% of the Federal Poverty Level had "substantial" income deficits, only 40% of the households with income between 101% and 150% did. In contrast, while 5% of the households with income below 50% of Poverty had either no income deficit, or a slight deficit, 46% of Cohort participants with income between 101% and 150% had no deficit or only a "slight" deficit.

Georgia REACH Cohort Participants by Poverty Level and Annual Income Deficit					
	Number of Cohort Participants by Poverty Level Range and Income Deficit				
Income Deficit	0-50%	51-100%	101-150%	151% or more	Total
None	1	32	41	5	79
Slight	0	2	7	0	9
Moderate	3	6	16	0	25
Substantial	17	59	42	0	118
Total	21	99	106	5	231
	Percent of Cohort Participants by Poverty Level Range and Income Deficit				
Income Deficit	0-50%	51-100%	101-150%	151% or more	Total
None	5%	32%	39%	100%	34%
Slight	0%	2%	7%	0%	4%
Moderate	14%	6%	15%	0%	11%
Substantial	81%	60%	40%	0%	51%
Total	100%	100%	100%	100%	100%

Energy-related risks were common to all levels of Federal Poverty Level within the Georgia REACH Cohort population. The percentage of all risks involving "energy risks" was roughly equal between Poverty Levels. While 36% (n=35) of the various risks faced by REACH households living with incomes at between 0% and 50% of Poverty were explicitly energy-related, 32% (n=123) of the total risks identified for households with income between 51% and 100% were. Similarly, 35% (n=149) of the total number of risks identified for households with income between 101% and 150% involved "energy" issues.

Energy-Related Risks for Georgia REACH Cohort Participants by Income as Ratio to Federal Poverty Level						
	0 - 50%		51 - 100%		101 - 150%	
	Number	Pct of Total	Number	Pct of Total	Number	Pct of Total
Carries utility arrears	3	3%	19	5%	18	4%
High winter burden	9	9%	43	11%	50	12%
Home never weatherized	9	9%	32	8%	41	10%
Lack of control over expenses	7	7%	17	4%	28	7%
Old and inefficient appliances	7	7%	12	3%	1	0%
Total number all identified risks	97	100%	383	100%	423	100%
Total identified energy risks	35		123		149	
Percent energy of total risks	36%		32%		35%	

The specific types of energy risks identified, however, differed markedly between income levels. Perhaps surprisingly, households at the lowest Poverty Level identified high winter burdens proportionately *less* often than did their higher income counterparts. In contrast, the lowest income households identified old and inefficient appliances, as well as a "lack of control over expenses," proportionately *more* often than did their somewhat higher income counterparts.

Without further research, it is not possible to conclusively ascertain the reasons for these differences. It is evident, however, that the risks identified by the lowest income households are persistent, year round problems. The risks reported by the highest income households identify seasonal weather-related risks. This is consistent with the notion that while overall bills are consistently unaffordable to those lowest income households, non-winter bills are more manageable to the higher income households, with problems manifesting themselves more in the high cost winter heating months.

Unlike the Poverty Level analysis, the types of risks identified for households did not substantially vary by the type of income deficit reported by the household. Certainly, no pattern emerges indicating that the energy risks facing Georgia REACH Cohort participants became either more frequent or more intense as the household's income deficit became bigger. The percentage of risks identified as "energy risks" (as defined here) remained virtually constant among income deficit levels (ranging from 33% for households with slight deficits to 35% for households with moderate or substantial deficits). For each of the five specific energy risks identified, the proportion of households experiencing those risks remained reasonably constant over all levels of income deficit.

Energy-Related Risks for Georgia REACH Cohort Participants by Annual Income Deficit								
	Level of Income Deficit							
	None		Slight		Moderate		Substantial	
	No.	Pct /a/	No.	Pct /a/	No.	Pct /a/	No.	Pct /a/
Carries utility arrears	16	6%	2	4%	5	5%	18	4%
High winter burden	33	11%	5	11%	12	12%	53	11%
Home never weatherized	24	8%	4	9%	11	11%	44	9%
Lack of control over expenses	17	6%	4	9%	5	5%	29	6%
Old and inefficient appliances	8	3%	0	0%	3	3%	20	4%
Total number all identified risks	288	100%	46	100%	102	100%	474	100%
Total number energy risks	98		15		36		164	
Percent energy risks of total risks	34%		33%		35%		35%	

NOTES

/a/ Percent is total number of identified risks.

Nature and Characteristics of Risks

In addition to identifying what risks Georgia REACH participants faced, the Georgia REACH program sought to assess the different attributes of the various risks facing the program's Cohort participants. REACH family advocates accomplished this by preparing a REACH Risk Assessment Matrix. The REACH Risk Assessment Matrix categorized risks with respect to six different attributes. Each risk was ranked on a scale of 1 to 3 for each of these six attributes of the risks facing the household. The attributes included:

- Were the risks the result of long-term circumstances (1), or were they of recent vintage (3)?
- Were the risks foreseeable (1) or unforeseeable (3) on a monthly basis?
- Were the risks large/high (1) or small/low (3) risks?
- Were the risks controllable (1) or uncontrollable (3)?
- Were the risks permanent (1) or temporary (3)? And
- Were the risks "regular" (1) or "occasional" (3)?

Distinct patterns appeared in how Georgia REACH Cohort participants viewed the energy risks that they faced. Four of the risks were considered to be of a long-term nature. The average ratings of the following risks all identified them as long-term (1) rather than recent (3).

- Household has no savings (1.02)
- Kid-related expenses (1.02)
- Lack of control over expenses (1.00)
- Old and inefficient appliances (1.00).

In contrast, the problems of carrying utility arrears (and paying corresponding late payment charges) (1.74), along with "high winter bill burdens" (2.19), were considered more recent problems.

Rating of Georgia REACH Cohort Participant Household Energy Risks by Risk Attribute

1	3	Carries Arrears (late fees)	No HH Savings	High Winter Bill Burdens	Kid-Related Expenses	No Control over Expenses	Old & Inefficient Appliances	Home not weatherized	Home is leaky
Long-term	Recent	1.74	1.02	2.19	1.02	1.00	1.00	1.00	1.00
Unforeseeable	Foreseeable	1.95	1.86	2.24	2.90	3.00	2.19	1.86	2.82
High/big	Low/small	1.74	1.03	1.06	1.32	1.00	1.31	1.02	2.31
Controllable	Uncontrollable	1.82	1.76	1.81	1.33	2.86	1.59	1.12	2.51
Permanent	Temporary	2.13	1.68	1.68	1.36	2.86	2.13	1.50	1.32
Regular	Occasional	1.74	2.10	1.65	2.37	1.06	1.44	2.29	1.10
Number of ratings in average		93	100	98	108	72	32	82	73

The observation that jumps out from the data in the table above is how the foreseeability is common to all of the eight identified risks. While the most "unforeseeable" of the eight risks involved having no savings and having no weatherization in the home, even these were both rated nearly 2 (with "1" being "unforeseeable" and "3" being "foreseeable").

- Having no control over expenses provided the grimmest picture, with this risk being rated long-term, foreseeable, big, uncontrollable, and regular.
- High winter bill burdens were rated as a foreseeable, big, uncontrollable risk, but also as a short-term, temporary and occasional risk.
- The problems posed by old and inefficient appliances were ranked as long-term, foreseeable, big, and regular. They were, however, also rated as controllable and temporary risks.
- Carrying utility arrears (and paying late payment charges) was rated as long-term, foreseeable, big and regular. Carrying arrears, however, was also rated as controllable and temporary.

Risk-Specific Interventions

The Georgia REACH project responded to each of these identified risks by identifying an intervention designed specifically to address the risk. The interventions, however, could easily *differ* as between households, since the interventions were intended to respond to the specific circumstances of the household. Common interventions included.

- Responses to carrying utility arrears (and paying late payment charges) involved not only helping negotiate payment plans, but also helping Cohort participants enter into levelized budget billing plans to help take the spike off of high winter heating/summer cooling bills. Responses to carrying utility arrears also included actions such as referring households to the state's low-income Weatherization Assistance Program (WAP) as well as providing budget counseling to help families develop money management plans.

- Responses to the risks posed by high winter bill burdens included responses varying from the development of money management plans (to coordinate higher winter bills, savings, and the identification of other expenses during the high cost winter months), enrolling in levelized billing plans, providing personalized energy education as to behavioral changes that can save energy, providing air sealing, and referrals to WAP.

- Interventions to more generalized concerns that household income was simply inadequate involved a range of activities ranging from helping households determine what additional public assistance they might be eligible for (e.g., Food Stamps, Earned Income Tax Credit, subsidized child care, Peachcare [health insurance] for children), to referring households to education assistance (e.g., GED courses), to referring households to employment assistance services (e.g., job training program, job resource center, micro-enterprise course for self-employed), to providing personalized budget services (e.g., creating a money management plan, creating a savings plan, providing budget counseling).

Other interventions provided in response to specific risks identified through the Risk Assessment Matrix included:

- Helping households apply for free school meals, as well as providing the Thrifty Parenting training, in response to the identification of "kid-related food expenses" as a household financial problem.

- Helping households create a savings plan, develop a money management plan, and apply for a Lifeline banking account in response to the lack of savings that would help in times of income or expense exigencies.

- Helping households find less expensive housing, as well as helping them apply for the excess shelter deduction for Food Stamps, when rents were found to be high relative to income.

- Referring households to assistance in collecting child support, as well as helping to apply for subsidized childcare and subsidized children's health care (Peachcare), when households identified child-related expenses as a particular burden.

Targeting interventions tailored to the specifically-identified risks facing a household is an intense, and more expensive, proposition than delivering more generic energy assistance (either cash or efficiency investments). Nonetheless, the experience of the Georgia REACH project supports the conclusion that the adverse impacts of unaffordable home energy bills can manifest themselves as other than an "energy" problem. While the Project Energize family advocates helped negotiate deferred payments plans for the unpaid bills of a definable group of Cohort participants, they also helped generate resources such as additional food assistance (Food Stamps, National School Lunch/Breakfast Program), for households that worried they could not *both* pay their energy bills *and* put adequate food on the table. Even within the energy realm, while some households needed additional cash assistance, others needed help in negotiating the process of enrolling in levelized billing (simply to take seasonal peaks off of bills). While some households needed building shell improvements, others needed appliance replacements. The experience of Project Energize supports the conclusion that targeted, tailored, household-specific interventions are an important aspect of responding to home energy unaffordability.

Home Energy Insecurity Scale

The Home Energy Insecurity Scale was used by Project Energize to measure the extent to which the Georgia REACH program improved the energy self-sufficiency of its low-income participants. The Home Energy Insecurity Scale can be used to quantitatively measure outcomes for home energy assistance programs such as REACH. The Scale was used as a supplement to traditional measurements of the impacts generated by low-income energy assistance programs. As was first observed about the Scale when it was developed for the federal LIHEAP office:

> The scale presented below represents a substantive improvement in measuring the outcomes generated by low-income energy assistance programs. Administrators of such programs have long struggled to develop a mechanism to capture the many facets of home energy unaffordability. Some efforts have focused on lowering home energy burdens. A household's "energy burden" is the household bill divided by the household's gross income.[14] This process, however, does not capture the circumstances of a household for whom the receipt of energy assistance results in an *increase* in the home energy burden because he or she is no longer required to cut off all rooms of the home but one. Some efforts have focused on the nonpayment of home energy bills (as well as the disconnection of service and other collection-related problems). This process, however, does not capture the circumstances of a customer that pays his or her bill, but reduces spending on household necessities for food or medicine in order to do so. Some efforts have focused on reductions in energy consumption. This process,

[14] A household with a bill of $1,200 and an income of $6,000 thus has an energy burden of 20% ($1,200 / $6,000 – 0.20).

however, does not capture the circumstances of a household whose energy unaffordability problems result from a combination of very low incomes (even though usage is very low as well).[15]

The Structure of the Home Energy Insecurity Scale

Understanding the structure of the Home Energy Insecurity Scale involves understanding two basic tools: thresholds and indicators. The "threshold" tells you where on the scale a household falls. The threshold is a conclusion. It represents the determination a program manager reaches about the extent of the energy self-sufficiency of a household. The "indicators" tell you into which threshold each household should be placed. The indicators are specific pieces of information about a household upon which the threshold conclusion is based.

The Home Energy Insecurity Scale uses five thresholds. Households can be classified as either:

- Thriving
- Capable
- Stable
- Vulnerable
- In-Crisis

The decisionmaking process allows each household to fall into one, but only one, of these five thresholds. Each threshold must be defined so that a household either fits, or it does not. Conversely, if a household does *not* fit into one threshold, the household *must* fit into another. Each of the five thresholds used in the Home Energy Insecurity Scale represents a conclusion as to the level of energy self-sufficiency by a household. The Home Energy Insecurity Scale has been designed to represent the energy-equivalent of other household scales.

The thresholds that comprise the Home Energy Insecurity Scale indicate the following about a household:

- A *thriving* household is one that has achieved generally accepted standards of well-being. The thriving household can engage in the full range of home energy uses of its choice without outside assistance and without financial strain.
- A *capable* household is secure, even though not having achieved the full range of generally accepted standards of well-being.

[15] Colton, Roger (2003). *Measuring the Outcomes of Home Energy Assistance Programs through a Home Energy Insecurity Scale*, at 1, U.S. Department of Health and Human Services, Administration for Children and Families, Office of Community Services, Division of Energy Assistance: Washington D.C. (hereafter, LIHEAP Home Energy Insecurity Scale).

- A *stable* household does not face significant threats and is unlikely to be in immediate crisis. A stable household may on infrequent occasion need to engage in temporary or inappropriate actions because it lacks money to pay its home energy bills, but it does not do so regularly.

- A *vulnerable* household is one that is not in immediate danger, but that may avoid this danger only through temporary or inappropriate solutions. A vulnerable household may occasionally face energy choices that require it to compromise not merely on comfort and/or convenience, but on basic household energy needs such as heating and/or hot water.

- An *in-crisis* household faces immediate needs that threaten the household's physical and/or emotional safety. Three alternative conditions exist any one of which might place someone in the "in-crisis" threshold: (1) the household goes without energy; *or* (2) the household has energy, but has to routinely compromise on its energy use for basic household necessities; *or* (3) the household does not compromise on its energy use, but in order to maintain that energy use, must compromise on *non-energy* basic necessities.

Data collection for the Home Energy Insecurity Scale involved gathering information twice. Because the scale defines outcomes in terms of the *change* in self-sufficiency status, family advocate staff were required: (1) first to measure initial conditions (to establish a base line of data); and (2) second, to determine to what extent, if at all, household situations have changed. Project Energize took its first measurement at the time a household applied for program assistance. The second measurement was then again taken six (6) months after assistance was provided.

The measurements were then combined and presented using a two-dimensional matrix. The columns of the matrix corresponded to the beginning level of each household tracked. The rows represented the ending levels of those households. As a result, the cells of the table (representing the intersection of the "beginning" and "ending" level of home energy insecurity) represent all of the possible changes that might occur to households.

The Home Energy Insecurity Scale Implementation

The process of implementing the Home Energy Insecurity Scale within the Georgia REACH project involved three steps:

- First, the basic pieces of factual information that are collected and used to determine which threshold best describes a household are called "indicators." The indicators used in a scale have no significance ascribed to them standing alone. They are facts about a household. In Georgia, these facts were collected through the administration of the Home Energy Insecurity Survey. The first (of two) surveys was completed at the time a household applied to participate in the Georgia REACH program. Intake staff administered the survey at the time of the initial intake call. Staff reported that the survey generally took roughly ten minutes to complete and was not resisted by the program applicant.

- A second survey was completed at the end of program participation (for Cohort participants) or the end of six months (for control participants). Completion of the second survey occurred at one of the regularly scheduled contacts between the family advocate and the REACH cohort participant. The second Home Energy Insecurity Survey was completed at the time of the "exit interview" with each Cohort participant. For control participants, family advocate staff sought to make telephone contact in order to complete the second survey. These efforts to make telephone contact, however, frequently failed. Staff reported that many control participants had moved, had telephone service disconnected, or had otherwise lost contact with the REACH program. Where telephone contact was not made, the staff mailed a letter asking the control participant to contact the Project Energize staff to complete the program. Even though final payment of a financial incentive for participating as a control group member was withheld pending this final contact, no second contact was made with the bulk of control group participants. Future programs need to investigate new ways --either through improved procedures or through higher incentives-- to ensure the completion of both first and second Home Energy Insecurity Surveys.

- Finally, the data from each survey was entered into a computer data base and used to determine the "pre" and "post" threshold for each Cohort and Control participant. Data was generally supplied at the close of the REACH project. Scoring and categorization of each REACH participant thus occurred on an after-the-fact basis and was used exclusively for program evaluation purposes. Future use of the Home Energy Insecurity Scale might include not only as a tool to measure program outcomes, but as an additional tool to identify risks and to correspondingly target specific interventions based upon that risk identification.

From a process perspective, the Home Energy Insecurity Scale represented a reasonably easy, non-intrusive method by which to collect data on the energy self-sufficiency of Georgia REACH program participants. Staff reported no household resistance to responding to survey questions. Moreover, staff reported that the survey did not impose unreasonable additional time burdens and was easily incorporated into the intake and exit interview process. To the extent that problems existed, those problems revolved around the inability to re-make contact with REACH control participants after a lapse in contact of six months or more.[16]

CLIENT SATISFACTION

One measure of the efficacy of a program such as Project Energize is whether the program delivers the services and benefits in such a way that program participants are "satisfied" with their participation. Project Energize measured the satisfaction of Cohort participants through an "exit interview" at the conclusion of the program. Cohort participants were paid a stipend of $100 upon completion of the exit interview. If an interview could not be completed, the Cohort participant forfeited that stipend.

[16] The program was ***designed*** to have a lapse in contact. The control group received no interventions from the Project Energize staff.

While program protocols and procedures called for an exit interview with all Cohort participants, Project Energize was not successful in reaching 100% of program participants. Despite the offer of the cash stipend based on formal completion of participation in Project Energize through an exit interview, such exit interviews were completed for only 136 of the 284 Cohort participants.

The exit interview asked six basic questions:

- Do you feel Project Energize provided the services explained to you during enrollment?
- Did the program meet your expectations?
- Was the staff caring, professional, knowledgeable and friendly?
- Will your household continue to use the energy saving measures learned through Project Energize in the future?
- Are you going to maintain a money management plan now and in the future?
- Has Project Energize benefited your children and made them more energy conscious?

For each of these six questions, a person could provide one of four responses: (1) strongly agree; (2) agree; (3) disagree; or (4) strongly disagree.

In addition to these six closed-ended questions, the exit interview asked five open-ended questions:

- What were the greatest benefits to your household from Project Energize?
- What did you like best about the program?
- What did you like least about the program?
- Do you feel that Project Energize can be improved (and how)?
- Do you have any additional comments you would like to make about Project Energize?

Client Perception of Program Accomplishments

Participants in Project Energize provided overwhelmingly favorable responses to the program through the exit interviews.[17]

[17] It is, of course, not possible to know what the attitudes of those participants who chose not to complete the program by providing exit interviews. It is possible, speculative but possible, that those persons who were satisfied with the program were those who chose to complete the program by participating in the exit interview.

- 120 of the 136 households participating in the exit interview said that they "strongly agree" when asked whether Project Energize provided the services that were explained during the intake process. The other 16 respondents answered "agree" to whether the program delivered the services it promised it would deliver.

- 114 of the 136 households participating in the exit interview said that they "strongly agree" when asked whether Project Energize met their expectations. The remaining 22 respondents answered "agree" to whether the program met their expectations.

- 123 of the 136 households participating in the exit interview said "strongly agree" when asked whether Project Energize staff were caring, professional, knowledgeable and friendly. The remaining 13 respondents answered "agree" to whether the staff was caring, professional, knowledgeable and friendly.

- 114 of the 136 households participating in the exit interview said that they "strongly agree" when asked whether the household would continue to use the energy saving measures learned through Project Energize in the future. The remaining 22 respondents answered "agree" to whether the household would continue to use the energy saving measured learned through the program.

- 96 of the 136 households participating in the exit interview said that they "strongly agree" that the household would maintain a money management plan now and in the future as developed through Project Energize. While no-one "disagreed" (or strongly disagreed) that they would maintain their money management plan,[18] the fact that there was a significant drop in the number of most favorable responses indicates that Project Energize participants actively considered this question and were skeptical about the long-term efficacy of the money management plan that had been developed. This skepticism about the money management plan is consistent with the reports that "income is inadequate" was the household risk most frequently identified in the Risk Assessment Matrix, with more than twice the number of households identifying this as a risk compared to the next most commonly identified household risk (no savings/inability to respond to financial exigencies).

- Only 74 of the households participating in the exit interviews responded "strongly agree" when asked whether Project Energize benefited the participant's children and made the children more energy conscious. In addition, 54 participants "agreed" that Project Energize benefited the children, while eight (8) Project Energize participants "disagreed" that the program benefited their children and made them more energy conscious. While the program may have benefited the householder (through energy training and direct energy efficiency investments), the efforts to encompass the entire family fell short of program expectations.

The exit interviews emphasized the conclusion that the intense interventions, and ongoing working relationships between project staff and the program's Cohort participants lay at the heart

[18] It may have been deemed socially unacceptable for a Project Energize participant to respond that he or she did not intend to maintain the money management plan in the future.

of the program. When providing unaided responses to the open-ended question of what Cohort participants felt was the greatest benefit provided through Project Energize:

- Eight (8) responded with a comment about the financial budget counseling they received through the program;
- 26 responded with a comment that focused on the energy efficiency ***knowledge*** or learning that they had received;
- 37 responded with a comment that focused on the energy efficiency ***investment*** that had been made in their home (either through weatherization or new appliances or both);
- 13 responded with a comment that focused on the care and assistance provided by the staff;
- 10 responded with a comment that focused on their increased ability to make ***utility bill payments***; and
- 27 responded with a comment that focused on the ***reduced bills*** they experienced after participation in the program.

Client Perception of Staff Assistance

Of the 104 persons providing a response to the open-ended question about what respondents "liked best" about Project Energize,[19] however, 61 provided a comment that explicitly cited the Project Energize staff. Illustrative of such comments were:

- "Feeling like you mattered and being able to reach your case worker"
- "Staff really helped me. She was so nice and she stayed on the job if I needed anything she helped."
- "Very informative and encouraging when you feel things are hopeless in maintaining a budget."
- "I also am proud to say I had the best consultant that helped with all my needs and can answer all questions. If she didn't know, she found out."
- "Please keep Ms. Cassandra forever."
- "The staff was always there when I needed them and kept in touch with me."
- "Staff is knowledgeable and really seem to love their jobs helping others."

[19] 32 persons participating in the exit interview did not respond to this question.

- "Cassandra was always there to answer any question and help me in any way she could."

- "The people who helped me were so nice. I love the people who work for them."

- "They are delightful people to encounter. They are so professional and knowledgeable and friendly."

- "Thanks for educating. In educating and equipping, the staff never made me feel bad about my situation."

- "My caseworker was a gem; she's caring and resourceful."

- "The staff attitude is always to offer help."

One person mentioned "access to staff when a problem arises" as what she liked best, while another mentioned "the kindness" of staff. More than ten respondents to the exit interview included the word "caring" in their reference to Project Energize staff. A nearly equal number of respondents referred to the "concern" of the staff, while others referred to the "interest" of the staff. One person mentioned that staff were "good listeners" as what she liked most, while another referred to the "advocacy on behalf of the client." One person mentioned "the personal contact" as what she liked most.

While the list of quoted comments above is lengthy, each of these specific staff-related comments standing alone --and certainly the sum of these comments when considered in their totality-- support the conclusion that Project Energize accomplished one of the major objectives of the Georgia REACH program. Early in its REACH application, the State of Georgia (and Partnership for Community Action, the administrating community action agency) said that what Project Energize was all about was to "systematically assess and identify the areas and levels of risk the family faces, assist the family in setting and working toward concrete goals, and combine supportive relationships with tangible help." It is impossible to review the exit interviews provided through Project Energize and conclude that the program did anything but accomplish that objective.

The Client Complaints

The program was not without complaints that surfaced in the exit interviews. Fewer than half a dozen answers, however, were provided in response to the question about what Cohort respondents "liked least" about Project Energize. One person reported that the replacement refrigerator was "smaller than the original." Another person complained that program assistance did not arrive in time to prevent a utility shutoff. Several persons reported that the program should have provided "more financial assistance" or "more money." While not to be dismissed, the complaints do not represent fundamental flaws in either the design or implementation of the Project Energize program. Project Energize was not designed to offer financial assistance to program participants. While the very sparseness in the number of complaints about the lack of

financial aid indicates that this program design was generally understood, perhaps a specific disclaimer to that effect would have been helpful.

SUMMARY AND CONCLUSIONS

Project Energize operated largely as intended. The program delivered the services it had promised to deliver. The Georgia REACH application indicated that it would assess the risks facing each family participant. Once those risks were determined, in addition to delivering a base set of interventions (consisting of an in-home energy assessment, in-home one-on-one financial and energy counseling, an air-sealing energy audit), the project would continue to deliver intense, continuing household case management over the course of program participation. This ongoing contact and individualized attention, not determined by program design and policy but rather by individualized household needs, was one of the highlights of the program.

As with any multi-year program, staff turnover presented an occasional problem. But staffing at the project management level was stable for the length of the program. In addition, the staff selection (and staff training) of family advocates --which would involve make-or-break decisions as to program effectiveness-- resulting in continuing praise for the knowledge, care and professionalism of these line-personnel.

The program adhered to its basic premises as it was implemented and yet was flexible enough to adapt to lessons learned as program lessons were learned. A continuing focus on fuel assistance recipients was retained throughout. However, the exclusive focus on single parents with at least some wage income was relaxed in order to generate sufficient participation. The mandate that households have twelve (12) consecutive months of residence at their current home and that they agree to make no change in residence within the next consecutive 12-month period was encouraged, but found to be not "enforceable" to any extent. Disappointments included the inability to gain greater participation of Cohort households in the group energy efficiency workshops (even given what seemed to be substantial monetary incentives) and the inability of staff to obtain second Home Energy Insecurity Survey responses from control participants.

Data collection from utilities was smooth and effective, despite the decision of Southern Gas Company not to cooperate with the program. Georgia's retail choice natural gas market, however, proved to be an insurmountable obstacle to the collection of gas billing and payment data over an extended period of time (as households changed suppliers before, during and after their program participation, even if not changing residences). Future projects need to develop improved data collection from customers who can shop at multiple vendors over a multi-year project period.

In sum, while not without the occasional problem, Project Energize appears to have been adequately staffed, properly trained, and appropriately implemented (including both administration and oversight).

CHAPTER 4: IMPACT EVALUATION

The purpose of this chapter is to address the substantive evaluation questions identified in the introduction above. The broad objective of Project Energize was to assist participant households move toward energy self-sufficiency. "Self-sufficiency," however, is a squishy concept at best. The text below seeks to operationalize that concept through answering the following questions:

- Did Project Energize result in a reduced home energy insecurity?
- Did Project Energize result in reductions in energy consumption?
- Did Project Energize result in reduced energy bills (and thus improved energy burdens)?
- Did Project Energize generate an improvement in energy efficiency knowledge?
- Did Project Energize generate an improvement in utility bill payment patterns?

Other evaluation questions have been addressed in other sections of this evaluation.

HOME ENERGY INSECURITY SCALE

The discussion below is divided into two basic sections. The first part examines the overall Home Energy Insecurity Rating for REACH participants. This section reports the Home Energy Insecurity Ratings both upon entrance into the REACH program and after one year of participation in the REACH program. It then identifies the improvement, if any, in the Home Energy Insecurity Rating over that time period. Any upward movement in the Home Energy Insecurity Scale is deemed to be an improvement in the home energy self-sufficiency of the household.

The second part examines the movement, if any, on individual questions making up the Home Energy Insecurity Survey. In addition to deconstructing the Home Energy Insecurity Scale to determine how Georgia REACH participants perform relative to each specific survey component, this section seeks to identify which aspects of the survey move households into particular Home Energy Insecurity thresholds. A question-by-question analysis is performed to determine the extent to which, if at all, REACH Cohort participants exhibited greater self-sufficiency than did the control group participants that received none of the REACH interventions.

Improvement in Self-Sufficiency

The theory of the Georgia REACH program is that the unaffordability of home energy impedes the self-sufficiency of low-income households. As a result of unaffordable home energy burdens, households may fail to make payments toward their home energy bills. Even in those instances where payments are made, even if in a complete and timely fashion, households facing

unaffordable home energy burdens may make other household budget trade-offs. As described in detail above, the Home Energy Insecurity Scale incorporates the full range of household decisions into a single measurement of self-sufficiency. By comparing this measure of self-sufficiency for households that received REACH interventions to the same measure for households that did ***not*** receive interventions, it will be possible to assess the impact the REACH program had on improving household self-sufficiency through addressing home energy unaffordability problems.

The Georgia REACH program generated positive impacts on improving the self-sufficiency of program participants. Georgia REACH Cohort participants improved their performance on the Home Energy Insecurity Scale more frequently, and to a greater extent, than did the Georgia REACH control participants. Consider that the table below shows as follows:

- The REACH Cohort group generated "thriving" households, while the control group did not. While none of the 178 Cohort participants[20] began the program as "thriving," four (4) (2.2%) of the Cohort group were classified as thriving after receiving Georgia REACH interventions. Of those, three (3) moved up to thriving from the "vulnerable" threshold, while one moved up from "capable." In contrast, none of the control group participants were considered thriving either before or after the program.

- The REACH Cohort population generated far more "capable" households than did the control group. While four (4) (2.2%) of the Georgia REACH Cohort participants were considered "capable" at the time they entered the program, 23 (12.9%) were considered capable after receiving REACH interventions. In contrast, the number of REACH control participants that were classified as "capable" stayed constant at three (3) on both the first and second surveys.[21]

- The REACH Cohort population experienced a greater increase in home energy stability than did the control group. While 22 Cohort participant households (12.4%) were classified as "stable" in the pre-survey, 39 Cohort participants (21.9%) were classified as stable after receiving REACH interventions. In fact, however, there was a greater improvement than simply the 17 household difference (from 22 to 39). Since eight (8) of the Cohort participants originally classified as stable improved to capable, eight (8) other households improved to stable to get back to the original figure of 22. An additional net 17 households then *also* improved, an overall net improvement of 25 households. In contrast, three (3) of the six (6) control group participants classified as stable remained in that same category, with two others degrading to "vulnerable" and one improving to capable.

[20] To be included in this analysis, the REACH participant was required to complete both the first and second survey in order to allow a comparison. Not all REACH participants, either Cohort or control, completed both the first and second Home Energy Insecurity surveys. Most frequently, for those households excluded, a participant completed the first survey but not the second.

[21] These were all different households, however, with the three originally classified as capable all falling to "vulnerable" and a different three improving to capable at the time of the second survey.

- The REACH Cohort population succeeded in removing households from their vulnerable status. Of the 178 Cohort participants completing both the first and second Home Energy Insecurity Surveys, 135 (75.8%) were originally classified as "vulnerable." After the REACH interventions, only 75 (42.1%) remained as vulnerable, while 32 Cohort participants (18.0%) improved to stable. An additional 16 Cohort participants (9.0%) improved to either capable (n=13) or thriving (n=3). Only 12 degraded from being vulnerable to being in-crisis. In contrast, 41 of the 53 control group households (77.4%) were classified as "vulnerable" in the first Home Energy Insecurity Survey. Of those 41 control group participants, 33 (62.3%) remained vulnerable, with six (6) improving to either stable (n=4) or capable (n=2), and two (2) falling to in-crisis. These six were replaced in the control "vulnerable" population by five households that fell from either capable (n=3) or stable (n=2) and three improved from in-crisis.

Change in Home Energy Insecurity Status Over Period of Georgia REACH Program

Cohort Participant Population

		Post- Survey					
		Thriving	Capable	Stable	Vulnerable	In-Crisis	Total
Pre- Survey	Thriving	0	0	0	0	0	0
	Capable	1	2	0	1	0	4
	Stable	0	8	7	7	0	22
	Vulnerable	3	13	32	75	12	135
	In-Crisis	0	0	0	13	4	17
	Total	4	23	39	96	16	178

Control Participant Population

		Post-Survey					
		Thriving	Capable	Stable	Vulnerable	In-Crisis	Total
Pre- Survey	Thriving	0	0	0	0	0	0
	Capable	0	0	0	3	0	3
	Stable	0	1	3	2	0	6
	Vulnerable	0	2	4	33	2	41
	In-Crisis	0	0	0	3	0	3
	Total	0	3	7	41	2	53

- Even though the Georgia REACH Cohort population removed most households from their "in-crisis" status, other Cohort households fell into crisis during the program. While 17 of the Georgia REACH Cohort households (9.6%) were classified as "in-crisis" on the first Home Energy Insecurity Survey, 16 were classified as in-crisis after receiving REACH interventions. Only four (4) of the 16 had remained as "in-crisis" households after the REACH interventions. Thirteen (13) households that had

been in-crisis improved to the "vulnerable" classification, to be replaced by 12 that had been vulnerable that degraded to in-crisis.

Overall, the table below shows whether a move between Home Energy Insecurity categories in the pre- and post-surveys is considered to be an improvement (+), a degradation (-) or no change (0). Of the 25 potential changes, ten represent an improved status, ten represent a degraded status, and five represent no change in status.

Improvement (+) or Degradation (-) in Home Energy Insecurity Status Over Period of Georgia REACH Program

		Post- Survey				
		Thriving	Capable	Stable	Vulnerable	In-Crisis
Pre- Survey	Thriving	(0)	(-)	(-)	(-)	(-)
	Capable	(+)	(0)	(-)	(-)	(-)
	Stable	(+)	(+)	(0)	(-)	(-)
	Vulnerable	(+)	(+)	(+)	(0)	(-)
	In-Crisis	(+)	(+)	(+)	(+)	(0)

NOTES: (0) means "no change."

Significantly more Georgia REACH Cohort participants experienced an improved Home Energy Insecurity status rather than a degraded Home Energy Insecurity status between the pre- and post- surveys. Of the 178 REACH Cohort participants:

- 70 (39.3%) experienced an improved status;
- 88 (49.4%) experienced no change in status; and
- 20 (11.2%) experienced a degraded status.

This improvement far exceeded the change in status among the Georgia REACH control participants. Of the 53 REACH control group participants:

- 10 (18.9%) experienced an improved status;
- 36 (67.9%) experienced no change no status; and
- 7 (13.2%) experienced a degraded status.

As can be seen, twice as many Cohort participants as control participants experienced an improved Home Energy Insecurity status, while somewhat fewer experienced a degraded status.

While the figures above show the number of households for whom the REACH program generated an improved (or resulted in a degraded or unchanged) Home Energy Insecurity status, they do not capture the *extent* of improvement. The percentages above, in other words, treat a

household improving from "vulnerable" to "capable" the same as a household improving from "vulnerable" to "stable." Not only did the REACH program generate a greater number of households improving their Home Energy Insecurity status, but the improvement was larger as well.

To measure the magnitude of the improvement, each category in the Home Energy Insecurity Scale was assigned a value of between 1 and 5, with higher values assigned as self-sufficiency improved. The "thriving" threshold, in other words, was assigned a value of 5 since it represents the highest degree of self-sufficiency. The "in-crisis" threshold was assigned a value of 1 since it represents the lowest degree of self-sufficiency. Aggregate values on the first and second surveys were calculated. These aggregate values were then placed in a ratio, with the experienced self-sufficiency values as the numerator and the total maximum possible values (assuming all participants were at the thriving level) as the denominator.[22]

The Georgia REACH Cohort population significantly increased its overall self-sufficiency after receipt of the REACH interventions. Within the Georgia REACH Cohort recipient population, 178 households completed both the first and second Home Energy Insecurity Surveys. As a result, the maximum possible value would be 890 (178 x 5 = 890). Using the values identified above, the experienced value on the first survey for Cohort participants was 369, a ratio of 0.41 (369 / 890 = 0.41), while the experienced value on the second survey was 437, a ratio of 0.49 (437 / 890 = 0.49). As can be seen, the Cohort population experienced an overall self-sufficiency value increase of 68, increasing the ratio by 0.08.

In contrast, the Georgia REACH control population experienced no change in its overall self-sufficiency during the time of the REACH program. Within the Georgia REACH control population, 53 households completed both the first and second Home Energy Insecurity Surveys. As a result, the maximum possible value would be 265 (53 x 5 = 265). Using the values identified above, the experienced value on the first survey for control participants was 115, a ratio of 0.43 (115 / 265 = 0.43), while the experienced value on the second survey was 117, a ratio of 0.44 (117 / 265 = 0.44). As can be seen, the control population experienced an overall self-sufficiency value increase of 2, increasing the ratio by 0.01.

One reason the overall value is important is because it captures both the increase and the decrease in self-sufficiency among the various REACH participant households. The extent to which some REACH participant households improve their self-sufficiency status, in other words, is offset by the extent to which other REACH participant households experience a degraded self-sufficiency status. The aggregated values discussed above are presented on a ***net*** basis.

The Georgia REACH Cohort participant population begins to approach a level of having all households, on average, rate "stable" on the aggregate index. If all participant households were

[22] If all participants were at the thriving level, in other words, they would all receive a value of 5. The number of participants times a value of 5 would thus represent the total maximum possible value on the Home Energy Insecurity Scale.

rated as "stable," the self-sufficiency index would be 0.60.[23] The REACH program improvement (0.08) eliminated nearly half of the gap (0.19) between the beginning Home Energy Self-Sufficiency Index and an ending Home Energy Self-Sufficiency Index representing an average categorization of stable.

Aggregate Improvements in Home Energy Self-Sufficiency
Georgia REACH Cohort and Control Populations

Insecurity Threshold	Assigned Values	Distribution of Participant Households				Aggregate Self-Sufficiency Values			
		Control		Cohort		Control		Cohort	
		First	Second	First	Second	First	Second	First	Second
Thriving	5	0	0	0	4	0	0	0	20
Capable	4	3	3	4	23	12	12	16	92
Stable	3	6	7	22	39	18	21	66	117
Vulnerable	2	41	41	135	96	82	82	270	192
In-Crisis	1	3	2	17	16	3	2	17	16
Totals		53	53	178	178	115	117	369	437
Maximum possible						265	265	890	890
Ratio: actual to maximum						0.43	0.44	0.41	0.49

The Indicators Associated with Differing Levels of Home Energy Insecurity

The Georgia REACH participant groups experienced differing parameters that classified households into differing Home Energy Insecurity thresholds. Some households experienced only one indicator that placed them into a particular threshold. Others experienced multiple indicators, any one of which would place them into the threshold at which they were classified. The discussion below examines the specific questions posed on the Home Energy Insecurity Survey and assesses whether particular characteristics demarcate households that are in greater or lesser home energy insecurity.[24] The discussion below is divided into two parts. The first part examines the number of indicators underlying the classification of any given REACH participant into a Home Energy Insecurity threshold. The second examines the combination of indicators underlying any particular classification.

A wide range of indicators that evidence each household's classification supports the classification of Georgia REACH participants into particular Home Energy Insecurity thresholds. Households falling into the in-crisis threshold tended to be the participants for whom one (and

[23] The "stable" category has a value of 3, which would be compared to the maximum value of 5. As a result, irrespective of the size of the population, if all households were rated as stable, the Home Energy Self-Sufficiency would be 0.60 ([program participants x 3] / [program participants x 5] = 0.60).

[24] Unlike the discussion above, this discussion does not depend on the participant responding to ***both*** the first and second surveys. Accordingly, participants are included in the analysis irrespective of whether they responded to both surveys.

only one) indicator was determinative of their Home Energy Insecurity classification.[25] On the first survey, for example, 27 of the 31 Cohort participants classified as "in-crisis" were placed into that classification on the strength of only one indicator, while 18 of 22 control participants were classified as in-crisis based on the strength of one indicator. In neither group did any participant have more than one indicator indicating an "in-crisis" situation. On the second survey, 13 of the 16 Cohort participants found to be in-crisis were classified on the basis of a single indicator, while both of the two control group participants were classified on this basis.[26]

- The vulnerable population was supported by multiple indicators the highest proportion of the time. In the first survey, households classified as vulnerable had two or more supportive indicators in between 63% (control group) and 74% (Cohort group) of the time. In the second survey, households classified as vulnerable had two or more supportive indicators in between 59% (control group) and 65% (Cohort group) of the time.

- Multiple indicators in fewer instances supported the stable population. In the first survey, the stable population was supported by two or more indicators in between 31% (Cohort group) and 55% (control group) of the instances. In the second survey, the stable population was supported by two more indicators in between 29% (control group) and 39% (Cohort group) of the time.

- While the percentages of households classified as "capable" were supported by multiple indicators at a wide range of values, the total numbers of households classified as capable were small enough that a change of one (or just a few) households made a large percentage difference.

One would have expected within the Georgia REACH Cohort population to see a reduction in the number of multiple indicators supporting the classification of households into thresholds indicating a lack of self-sufficiency. Even if the REACH interventions were insufficient to allow a household to improve their Home Energy Insecurity status by moving up one or more thresholds, the interventions should have been able to help those households resolve at least *some* of their energy-related self-sufficiency problems. In fact, this is precisely what appears.

[25] The significance of having a single indicator be determinative is that, in the absence of that indicator, the household would have been classified one threshold higher. An in-crisis household, for example, would have been classified as a "vulnerable" household in the absence of the single indicator supporting an in-crisis classification.
[26] The "thriving" classification stands in contrast to the single indicator underlying a Home Energy Insecurity threshold. In order to be classified as "thriving," all 13 indicators must have been at the thriving level. It is not possible for a "thriving" household to have only one indicator (or any other number less than the total) be evidence of a thriving household.

Home Energy Insecurity Classification of Georgia REACH Cohort Participants By Number of Indicators Placing Participant in the Threshold										
No. of Indicators	First Survey					Second Survey				
	Thriving	Capable	Stable	Vulnerable	In-Crisis	Thriving	Capable	Stable	Vulnerable	In-Crisis
1	0	1	24	52	27	0	5	24	34	13
2	0	0	8	41	2	0	11	12	24	3
3	0	0	3	38	1	0	3	3	15	0
4	0	1	0	35	1	0	1	0	9	0
5	0	1	0	24	0	0	1	0	10	0
6	0	1	0	6	0	0	1	0	4	0
7	0	0	0	1	0	0	1	0	0	0
13	0	0	0	0	0	4	0	0	0	0
Totals	0	4	35	197	31	4	23	39	96	16
% 2 or more	n/a	75%	31%	74%	13%	n/a	78%	39%	65%	19%
% 3 or more	n/a	75%	9%	53%	7%	n/a	30%	8%	40%	0%
% 4 or more	n/a	75%	0%	34%	3%	n/a	17%	0%	24%	0%

Within the Georgia REACH Cohort population:

- While 74% of the first survey "vulnerable" households were supported by 2 or more indicators, only 65% of the second survey "vulnerable" households were. While 53% of the first survey vulnerable households were supported by three or more indicators, only 40% of the second survey vulnerable households were. While 34% of the first survey vulnerable households were supported by four or more indicators, only 24% of the second survey vulnerable households were.

- Even the in-crisis households demonstrated this result. While the percentage of in-crisis households supported by two or more indicators increased from the first to the second survey (13% to 19%), the percentage of in-crisis households supported by three or more indicators dropped from 7% to 0%, while the percentage of in-crisis households supported by four or more indicators dropped from 3% to 0%.

- In contrast, the percentage of "capable" households supported by two or more indicators increased from the first to the second survey (from 31% to 39%). This result, also, evidences the greater success of households receiving Georgia REACH interventions to resolve energy-related self-sufficiency problems.

Specific circumstances facing Georgia REACH Cohort participants frequently determine where those participants are classified on the Home Energy Insecurity Scale. Four questions, in particular, appear to drive the classification of Georgia REACH Cohort participants among the five Home Energy Insecurity thresholds.

- Of the 24 Cohort participants categorized as stable based on one indicator in the first survey, 14 (58%) were classified based on their response to Question 13. Question 13

asks: “In the last 12 months, did you have a supplier of your electric or home heating service threaten to disconnect your electricity or home heating fuel service, or discontinue making fuel deliveries, because you could not afford to pay a past-due home energy bill?” Possible responses for persons answering “yes” were “almost every month,” “some months but not all” or “in only 1 or 2 months.” In addition, Question 13 was the single determinative indicator for 22 of the 24 Cohort participants (92%) classified as stable in the second survey.

- Of the 52 Cohort participants classified as vulnerable due to a single indicator on the first survey, three survey questions accounted for 37 placements (71%). Question 2 (n=12) (23%) asked whether it was often true, sometimes true or never true that, within the past 12 months, “our home energy bill became due, and I didn’t have money to pay it without somebody’s help.” Question 8 (n=15) (29%) asked whether in the last 12 months, “did you ever use your kitchen stove or oven to provide heat because there wasn’t enough money to pay your home heating bills?” Question 14 (n=10) (19%) asked whether in the last 12 months, “did you have a supplier of your electricity or home heating fuel disconnect or discontinue your energy supply because you were unable to pay for a past-due home energy bill?” Two of those same questions were primary indicators of the 34 vulnerable households on the second survey as well. Question 8 (n=12) (35%) and Question 14 (n=9) (26%) were single indicators that placed households in the vulnerable threshold.

- Of the 27 Cohort participants that were classified as “in crisis” based exclusively on a single indicator, the primary factor involved Question 8 (n=10) (37%). Question 8 asked whether in the last 12 months “did you ever use your kitchen stove or oven to provide heat because there wasn’t enough money to pay your home heating bills?” (for those answering yes, responses included almost every month, some months but not all, in only 1 or 2 months). Three other indicators involved fewer absolute numbers than other classifications, but similarly high contributions to the proportion of Cohort households classified as in-crisis. Question 6 (n=6) (22%) asked whether in the last 12 months, “did you ever leave your home for all or part of the day because there wasn’t enough money for the home energy bill, or, did you ever turn off your hot water because there wasn’t enough money for the home energy bill?” Question 12 (n=5) (19%) asked “did you have occasion to use electric or home heating service in an account using a name that was not your own because you owed your supplier money on an account in your own name and did not have enough money to pay your past-due bill?” Question 14 (n=6) (22%) asked whether in the last 12 months, “did you have a supplier of your electricity or home heating fuel disconnect or discontinue your energy supply because you were unable to pay for a past-due home energy bill?”

For those households classified on the Home Energy Insecurity Scale based on a single indicator, the following questions made the least contribution to how households were classified:

- Question 3: “I couldn’t afford to heat or cool our home to the temperature we wanted it to be, or to use our water or appliances to the extent we wanted to use them.”

- Question 5: "I could not use our entire home because we could not afford to heat or cool it."

- Question 7: "In the last 12 months. . .did you ever not pay your home energy supplier because there wasn't enough money for the home energy bill?"

- Question 11: "In the last 12 months, did you have occasion to change the supplier of your electric or home heating service because you owed your supplier money and did not have enough money to pay your past-due bill?"

The table below sets forth, for those Cohort households for whom their classification on the Home Energy Insecurity Scale was based on a single determinative indicator, which indicators proved to be decisive.

Distribution of Home Energy Insecurity Ratings
By Question Determinative of Rating
When Rating Caused by One Indicator

Indicator = 1	First Survey					Second Survey				
Question	Thriving	Capable	Stable	Vulnerable	In Crisis	Thriving	Capable	Stable	Vulnerable	In Crisis
1	---	1	3	---	---	---	4	1	---	---
2	---	---	---	12	---	---	1	---	5	---
3	---	---	2	---	---	---	---	---	---	---
4	---	---	---	6	---	---	---	---	5	---
5	---	---	---	2	---	---	---	---	2	---
6	---	---	2	---	6	---	---	1	---	3
7	---	---	---	3	---	---	---	---	---	---
8	---	---	---	15	10	---	---	---	12	4
11	---	---	3	---	---	---	---	---	---	---
12	---	---	---	3	5	---	---	---	---	5
13	---	---	14	1	---	---	---	22	1	---
14	---	---	---	10	6	---	---	---	9	1

As reported above, while few households were classified based on four or more indicators supportive of the final classification, either two or three indicators supported the Home Energy Insecurity classifications of a number of households. The table below shows the questions that frequently appeared ***together*** as indicators of the classification of a household on the Home Energy Insecurity Scale. These combinations provide some insights into the interaction of factors affecting the self-sufficiency of Georgia REACH households.

The disconnection of utility service (Question 14) appeared most frequently in combination with other indicators for households whose Home Energy Insecurity classification was supported by two indicators. Households reporting a disconnection of service ***also*** experienced the following indicator supportive of their classification:[27]

- The home energy bill became due, and the customer did not have money to pay it without somebody's help (Question 2);
- I reduced our energy consumption to uncomfortable or inconvenient levels because I was running out of money to pay our home energy bill (Question 4);
- In the last 12 months, the customer used his/her kitchen stove or oven to provide heat because there wasn't enough money to pay the home heating bills (Question 8);
- In the last 12 months someone felt sick in the home because of the heat and not provided additional cooling because there was not enough money to pay the home energy bill (Question 9);
- In the last 12 months, the customer had occasion to change the supplier of electric or home heating service because he/she owed the supplier money and did not have enough money to pay that past-due bill (Question 11); and
- In the last 12 months, the customer had occasion to use electric or home heating service in an account using a name that was not your own because you owed your supplier money on an account in your own name and did not have enough money to pay your past-due bill (Question 12).

The threat of service disconnection (Question 13) was also frequently combined with other indicators supportive of the final Home Energy Insecurity classification. Households for whom the threat of service disconnection was one of ***two*** factors supporting their Home Energy Insecurity classification also experienced the following indicator supportive of their classification:

- The customer "worried whether my home energy bill would become overdue before I could get money to pay it" (Question 1);
- The customer could not afford to heat or cool our home to the temperature we wanted it to be, or to use our water or appliances to the extent we wanted to use them (Question 3);
- The customer left home for all or part of the day because there wasn't enough money for the home energy bill, or, turned off the hot water because there wasn't enough money for the home energy bill (Question 6);

[27] Other REACH Cohort households would also have responded to this question. The overlap presented here is for those questions that were both supportive of the final Home Energy Insecurity classification, in those instances where the classification was supported by two indicators.

- The customer had occasion to change the supplier of your electric or home heating service because he/she owed the supplier money and did not have enough money to pay the past-due bill (Question 11); and

- The customer had occasion to use electric or home heating service in an account using a name that was not your own because you owed your supplier money on an account in your own name and did not have enough money to pay your past-due bill (Question 12).

Reducing household energy consumption to "uncomfortable or inconvenient levels because I was running out of money to pay our home energy bill" (Question 4) was frequently combined with other indicators supportive of the final Home Energy Insecurity classification. Households whose reduction of energy consumption was one of two factors supporting their Home Energy Insecurity classification also experienced the following indicator supportive of their classification:

- The customer "worried whether my home energy bill would become overdue before I could get money to pay it" (Question 1);

- The customer's home energy bill became due, and he/she did not have money to pay it without somebody's help (Question 2);

- The customer could not use his/her entire home "because we could not afford to heat or cool it" (Question 5);

- The customer used the kitchen stove or oven to provide heat because there was not enough money to pay the home heating bills (Question 8); and

- The customer experienced an actual disconnection of home energy service due to inability to pay (Question 14).

Use of a kitchen stove or oven as a supplemental heating source when the REACH Cohort participant did not have money to pay the heating bill (Question 8) was frequently combined with other indicators of behavior representing efforts to reduce energy consumption. Households whose use of the kitchen stove or oven was one of two factors supporting their Home Energy Insecurity classification also experienced the following indicator supportive of their classification:

- The household closed off parts of its home "because we could not afford to heat or cool it" (Question 5);

- The Cohort participant left his/her home "for all or part of the day because there wasn't enough money for the home energy bill," or, turned off their hot water because there was not enough money for the home energy bill (Question 6); and

- The Cohort participant had "occasion to use electric or home heating service in an account using a name that was not your own because you owed your supplier money on an account in your own name and did not have enough money to pay your past-due bill" (Question 12).

Finally, the stress placed upon households because of the inability to pay their home energy bills was frequently combined with other indicators of household stress. Households whose "worrying" about "whether my home energy bill would become overdue before I could get money to pay it" was one of two factors supporting their Home Energy Insecurity classification also experienced the following indicators supportive of their classification:

- The household's home energy bill became due, "and I didn't have money to pay it without somebody's help" (Question 2);

- The household "reduced our energy consumption to uncomfortable or inconvenient levels because I was running out of money to pay our home energy bill" (Question 4); and

- The household at some point in the prior twelve months did "not pay your home energy supplier because there wasn't enough money for the home energy bill" (Question 7).

Other combinations of indicators were evident among the population of Georgia REACH Cohort participants whose Home Energy Insecurity classifications were supported by two factors. The combinations are set forth in the table below.

A similar analysis can be made for households whose Home Energy Insecurity classification was supported by three indicators. The individual indicators most commonly found in combination with other indicators for REACH Cohort participants whose classification was supported by three indicators included:

- Question 2: The home energy bill became due, and the customer did not have money to pay it without somebody's help. This was found in combination with other indicators 16 times;

- Question 4: The household reduced its energy consumption to uncomfortable or inconvenient levels because the customer was running out of money to pay the home energy bill. This was found in combination with other indicators eight (8) times;

- Question 5: The Cohort participant could not use their entire home because they could not afford to heat or cool it. This was found in combination with other indicators eight (8) times;

- Question 8: The Cohort participant had to use their kitchen stove or oven to provide heat because there was not enough money to pay the home heating bills. This was found in combination with other indicators 13 times;

Distribution of Home Energy Insecurity Ratings By Combination of Questions Determinative of Rating When Rating Caused by Two Indicators (Cohort Participants)											
2 Indicators		First Survey					Second Survey				
Question		Thriving	Capable	Stable	Vulnerable	In Crisis	Thriving	Capable	Stable	Vulnerable	In Crisis
1	2										
1	2	---	---	---	---	---	---	7	---	---	---
	4	---	---	---	---	---	---	1	---	---	---
	7	---	---	---	---	---	---	1	---	---	---
	13	---	---	4	---	---	---	---	7	---	---
2	3	---	---	---	---	---	---	1	---	---	---
	4	---	---	---	4	---	---	---	---	3	---
	5	---	---	---	---	---	---	1	---	---	---
	7	---	---	---	1	---	---	---	---	---	---
	14	---	---	---	7	---	---	---	---	4	---
3	13	---	---	1	---	---	---	---	1	---	---
4	5	---	---	---	2	---	---	---	---	2	---
	8	---	---	---	8	---	---	---	---	2	---
	14	---	---	---	3	---	---	---	---	---	---
5	8	---	---	---	4	---	---	---	---	2	---
6	8	---	---	---	---	2	---	---	---	---	1
	13	---	---	2	---	---	---	---	2	---	---
8	12	---	---	---	---	---	---	---	---	4	---
	14	---	---	---	9	---	---	---	---	4	2
9	14	---	---	---	---	---	---	---	---	1	---
11	13	---	---	---	---	---	---	---	2	---	---
	14	---	---	1	---	---	---	---	---	---	---
12	13	---	---	---	1	---	---	---	---	---	---
	14	---	---	---	2	---	---	---	---	2	---

- Question 13: The household's supplier of electric or home heating service threatened to disconnect the electricity or home heating fuel service because the customer could not afford to pay a past-due home energy bill. This was found in combination with other indicators 12 times; and

- Question 14: The household's supplier of electric or home heating service actually effected a disconnection of electricity or home heating fuel service because the customer could not afford to pay a past-due home energy bill. This was found in combination with other indicators 13 times.

The combinations of indicators found for REACH Cohort participants whose final Home Energy Insecurity classification was supported by three indicators is presented in the table below.

A number of conclusions can be reached from the data and discussion presented above. The Georgia REACH project was successful in improving the Home Energy Insecurity status of its Cohort participants. Not only did Project Energize improve the overall status of participants, by moving Cohort participants into a higher Home Energy Insecurity threshold, the project helped reduced the total number of factors that pushed households into lower Home Energy Insecurity thresholds. Even if a household, for example, did not succeed in moving from "stable" to "capable," Georgia REACH participants were successful in reducing the number of factors that caused them to be classified as "stable" rather as a more highly secure household.

The factors affecting Home Energy Insecurity include far more than nonpayment of the home energy bills. While nonpayment of home energy bills was frequently found in conjunction with other indicators of home energy insecurity, evidence of home energy insecurity was found also in the absence of nonpayment of home energy bills. The paid but unaffordable bill was a real phenomenon within the Georgia REACH population.

Finally, the Georgia REACH program helped to ***improve*** the Home Energy Insecurity status of the program's Cohort participants even if that improvement did not move those participants completely into the "capable" or "thriving" categories. A sharp improvement was particularly found in moving Cohort participants out of the "in-crisis" and "vulnerable" categories and into more secure, more self-sufficient, Home Energy Insecurity classifications. Whether or not the program succeeded in moving Cohort participants to the ***highest*** category, it did, indeed, succeed improving the self-sufficiency of Cohort participants. This upward movement in self-sufficiency was the articulated goal of Project Energize with which to begin.

Distribution of Home Energy Insecurity Ratings
By Combination of Questions Determinative of Rating
When Rating Caused by Three Indicators (Cohort Participants)

3 Indicators			First Survey					Second Survey				
Question			Thriving	Capable	Stable	Vulnerable	In Crisis	Thriving	Capable	Stable	Vulnerable	In Crisis
1	2	3										
1	2	3	---	---	---	---	---	---	1	---	---	---
		7	---	---	---	---	---	---	2	---	---	---
	3	13	---	---	1	---	---	---	---	---	---	---
	6	13	---	---	---	---	---	---	---	1	---	---
	11	13	---	---	2	---	---	---	---	2	---	---
2	4	5	---	---	2	---	---	---	---	---	2	---
		7	---	---	3	---	---	---	---	---	---	---
		8	---	---	6	---	---	---	---	---	---	---
		12	---	---	1	---	---	---	---	---	---	---
		14	---	---	3	---	---	---	---	---	2	---
	5	7	---	---	1	---	---	---	---	---	---	---
		8	---	---	---	---	---	---	---	---	1	---
		14	---	---	---	---	---	---	---	---	1	---
	7	9	---	---	---	---	---	---	---	---	1	---
	8	12	---	---	1	---	---	---	---	---	---	---
		14	---	---	1	---	---	---	---	---	---	---
	9	14	---	---	1	---	---	---	---	---	---	---
	12	13	---	---	1	---	---	---	---	---	---	---
	13	14	---	---	---	---	---	---	---	---	1	---
4	5	8	---	---	3	---	---	---	---	---	2	---
		13	---	---	1	---	---	---	---	---	---	---
		14	---	---	2	---	---	---	---	---	---	---
		14	---	---	2	---	---	---	---	---	---	---
	8	12	---	---	---	---	---	---	---	---	1	---
		14	---	---	2	---	---	---	---	---	1	---
	12	13	---	---	---	---	---	---	---	---	1	---
	13	14	---	---	1	---	---	---	---	---	---	---
6	8	14	---	---	---	---	1	---	---	---	---	---
7	8	13	---	---	2	---	---	---	---	---	---	---
		14	---	---	1	---	---	---	---	---	---	---
8	9	13	---	---	1	---	---	---	---	---	---	---
		14	---	---	3	---	---	---	---	---	1	---
	13	14	---	---	---	---	---	---	---	---	1	---

ENERGY USAGE REDUCTIONS

The combination of energy efficiency interventions had a substantive impact on the energy consumption of Georgia REACH participants. Three groups of REACH participants were evaluated to assess the impact of REACH activities on energy consumption:

- Electric "baseload" (*i.e.*, non-heating) users;
- Electric heating users; and
- Natural gas (heating) users

Usage consumption was collected for both control and Cohort REACH participants. The control group had no interventions directed toward them. The Cohort group had one or more of the following energy efficiency interventions:

- A blower-door-aided energy assessment, with a variety of air sealing measures designed to reduce the leakiness of the home as described in Chapter 2 above;
- Individual one-on-one energy education as described in Chapter 2 above;
- Group energy efficiency workshops delivered by Southface Institute as described in Chapter 2 above; and
- Appliance replacement for a limited number of the Cohort population, as described in Chapter 2 above.

For the entire Georgia REACH Cohort and control populations, energy consumption data was obtained on a month-by-month basis. As is not uncommon in projects such as this, multiple data collection problems arose and were addressed over the course of the project. Data collection was more of a problem for natural gas customers than for electric customers. The common data collection problems included, among other things:

- Southern Company Gas, which refused to release data on REACH participants.[28] Southern Company reported that it "did not have time" to respond to the releases submitted by their customers asking for billing and usage data for their own accounts. As a result, 52 REACH participants (15 control and 37 Cohort households) that were Southern Company Gas customers were excluded from this part of the evaluation as not having natural gas data.
- A second data collection problem involved the inability to match REACH program records with utility company records. Matches were made on three data points: (1)

[28] Southern Company Gas was the only Georgia utility that refused to cooperate with the Georgia REACH project. Companies providing data included Georgia Natural Gas, Shell Energy, Scana Regulated Gas, Energy America, ACN Gas, Georgia Power Company, Infinite Energy, Snapping Shoals Electric Membership Cooperative, and Walton Electric Membership Cooperative.

name; (2) address; and (3) account numbers. To the extent that REACH intake workers obtained a copy of a utility bill (which they were asked to do), that bill was provided to the utility in addition to a client release form authorizing release of utility information to the REACH program. Providing a copy of a bill was a tremendous help in matching utility and REACH records. Nonetheless, for a number of utility customers, no bills were received, matches could not be made, and data was not obtained.

- Perhaps the biggest data collection problem arose because of the nature of the Georgia retail natural gas market. In Georgia, residential customers are allowed to choose their natural gas supplier. The competitive supplier, not the natural gas distribution utility (*i.e.*, the "local utility"), provides bills to the end-user in Georgia. Over the course of the REACH project, the REACH population, whether or not they physically changed addresses, changed their natural gas supplier. These changes had an impact on the availability of both "before" and "after" data for purposes of the usage evaluation. Indeed, the most common problem was the inaccessibility of natural gas consumption data for the time period *before* REACH efficiency interventions. Because electric customers do not have the option of changing suppliers, this did not prove to be a problem on the electric side.

Finally, as was anticipated at the beginning of the REACH project, utility customers that enrolled in Project Energize late in the process were not associated with REACH for a sufficiently long period to have enough time lapse to have "after" data.

Usage Assessment Methodology

To determine the energy savings attributable to the Georgia REACH Program, household electric and natural gas consumption data prior to and after participation were collected and analyzed. PRISM (Princeton Scorekeeping Method), a normalizing tool, was used to estimate weather-adjusted annual energy consumption based on energy usage and outdoor temperature. In order to prepare the data for PRISM, several steps were taken. Although the analysis of each fuel type was conducted separately, the analysis of electric and natural gas consumption data went through each of the following steps.

First, data were assessed, organized, and filtered to remove duplicate meter readings and accounts with significant missing data. Once the billing data contained only relevant meter readings, each participant's profile was split into pre and post periods based on their Program participation date. All meter readings collected within a month of the participation date were excluded to ensure that any consumption changes that may have occurred during the weatherization process itself were excluded from the analysis. The participants' median average participation date was then applied to the billing data collected on a comparable group of non-participants, essentially creating artificial pre and post periods. Applying this break to non-participants allows for the comparison of changes in post-weatherization energy consumption between the two groups over similar time periods. As a result, it is possible to identify overall energy consumption trends independent of the Program occurring in the region and then exclude those trends to determine the Program's true impact.

Sample Data Attrition

In order to obtain accurate PRISM results, only Cohort participants and Control participants with a minimum of nine eligible months of both pre- and post-consumption data were utilized for the analysis. A significant number of both Control and Cohort participants failed to meet this criterion and were excluded from the analysis.

Further, after modeling the control and Cohort participants with adequate pre and post data using PRISM, two additional filters were applied to avoid biasing the results. First, several control and Cohort participants demonstrating extreme annual energy consumption for residential households were dropped from the analysis. For the purposes of the electric and natural gas analysis, extreme annual consumption was defined as 75,000 kWh and 5,000 therms. Second, Control and Cohort participants exhibiting more than a 50% increase or decrease in annual energy consumption were identified as outliers and removed from the analysis.

However, after the three previous data requirements were applied the electric control group no longer accurately represented the remaining electric participants. Only 9 of the 109 (8.3%) remaining electric participants used electricity as their primary space heating fuel while 45 of the remaining 102 non-participants (44.1%) used electricity that way. Therefore it was necessary to limit the savings analysis to control and Cohort participants using electricity only for base-load measures and not as their primary space heating fuel. While reducing the sample further was not desired, it was essential to ensure the similarity of the control group to the Cohort group.
The table below presents data attrition resulting from the aforementioned data quality filters for electric and natural gas participants and provides the final samples used for the impact analysis.

Sample Attrition--Georgia REACH Consumption Analysis						
Electric Participants -- Sample Attrition						
	Cohort Participants			**Control Participants**		
	Removed	**Remaining (n)**	**Remaining (%)**	**Removed**	**Remaining (n)**	**Remaining (%)**
Original Sample		227	100.0%		214	100.0%
Lacked billing/eligible data	104	123	54.2%	98	116	54.2%
Extreme Consumption	1	122	53.7%	3	113	52.8%
Outliers	13	109	48.0%	11	102	47.7%
Electric Space Heating	9	100	44.1%	45	57	26.6%
Final Sample	***127***	***100***	***44.1%***	***112***	***57***	***26.6%***
Natural Gas Participants -- Sample Attrition						
	Cohort Participants			**Control Participants**		
	Removed	**Remaining (n)**	**Remaining (%)**	**Removed**	**Remaining (n)**	**Remaining (%)**
Original Sample		145	100.0%		122	100.0%
Lacked billing/eligible data	103	42	29.0%	85	37	30.3%
Extreme Consumption	1	41	28.3%	0	37	30.3%
Outliers	2	39	26.9%	4	33	27.0%
Final Sample	***106***	***39***	26.9%	***89***	***33***	27.0%

Energy Usage Reduction Results

Using the samples outlined above, the energy impact of the REACH Program was calculated for both the electric and natural gas program participants. It is important to note that due to difficulties collecting complete non-participant data, characteristics of the control groups may differ from participants and affect the determination of net program energy impacts. For example, in both the electric and natural gas analyses, the Cohort participants exhibited significantly higher average pre-participation[29] energy consumption than the control group. While a comparison of the Cohort participant and control participant sample allows for an understanding of the regional trends in energy consumption and aids the determination of a net program energy savings, it is important to note these differences and their possible impact on the analysis.

Electric Participants

The table below presents the weather-normalized annual electric savings attributable to the REACH Program. As evident in the table, average net electric impact was 835 kWh or 5.7% of

[29] Recall the "pre-participation" period was defined for non-participants as billing data collected prior to the median participant installation date

the average pre-participation normalized annual consumption. Due to small sample sizes it was not possible to break down participant savings by electricity provider.

Electric Savings				
	Average Pre-Participation Normalized Annual Consumption (kWh)	Average Post-Participation Normalized Annual Consumption (kWh)	Average Savings (kWh)	Average Savings (%)
Participants (n=100)	14,449	13,512	937	6.5%
Non-Participants (n=57)	12,381	12,279	102	0.8%
Net Impact			*835*	*5.7%*[30]

In addition, it should be noted that PRISM does not model as accurately in warmer climates that primarily use electric energy for cooling. While this is not a concern for the natural gas analysis, it does affect electric participants. To verify the accuracy of the PRISM's individual customer models, a regression model was also used to determine Cohort and control savings.[31] The regression model exhibited similar savings for participants, but higher savings for non-participants resulting in a net savings lower than generated by PRISM (3.9%). However, the regression only corrected for differences in weather between the pre and post and did not correct both periods according to long-term historical weather data as is done in PRISM.

Natural Gas Participants

The table below presents the weather-normalized annual natural gas savings attributable to the REACH Program. As presented in this table, Cohort participants experienced a significantly larger decrease in gas consumption (123 therms) than the control group (1 therm). As a result, the Program generated a net savings of 122 therms, or 12.6% of the average pre-participation normalized annual consumption.

[30] Since the pre consumptions differ significantly between participants and nonparticipants, an alternate savings estimate can be based only on percent changes as follows: 5.7% * 14, 449 = 824 kWh. In this case, this is very similar to the 835 kWh savings estimate, so this adjustment appears to be unnecessary.

[31] The model specification was as follows:

$AVGKWH_{it} = \alpha + \beta_1 AVGHDD_{it} + \beta_2 AVGCDD_{it} + \beta_3 POST_i + \varepsilon_{it}$, for customer i at month t. AVGKWH is the average daily consumption, AVGHDD is the average daily heating degree days, AVGCDD is the average daily cooling degree days, and POST is a separate dummy variable (1 in post period, 0 in pre period) for each participant or nonparticipant.

Natural Gas Savings				
	Average Pre-Participation Normalized Annual Consumption (therms)	**Average Post-Participation Normalized Annual Consumption (therms)**	**Savings (therms)**	**Savings (%)**
Participants (n=39)	969	846	123	12.7%
Non-Participants (n=33)	732	731	1	0.1%
Net Impact			***122***	***12.6%***[32]

In sum, the Georgia REACH program reduced both natural gas and electric consumption for Cohort participants receiving various energy efficiency interventions. In addition to providing personalized and group energy efficiency education provided to REACH participants, Project Energize provided specific housing shell and appliance efficiency investments. A blower-door guided air sealing effort, combined with selected appliance replacements, resulted in significant measurable energy usage reductions for both natural gas and electric consumption when compared to the program's Control group.

BLOWER DOOR AIDED LEAKAGE REDUCTIONS

The impacts of the Georgia REACH air sealing efforts are assessed from two perspectives. On the one hand, the success of the air sealing effort at *improving* the efficiency of the home can be measured. The primary factor used to measure the improvement in the tightness of the home for purposes of this evaluation is the ACH for each home. On the other hand, the success of the air sealing efforts at achieving designated levels of tightness can be measured.

The two measurements are substantively different. The first looks at the movement attributable to the air sealing effort. Whether or not a home is to be considered "tight" in the post-air-sealing blower door test, it might be significantly tight*er* (and thus more affordable).[33] The second looks at the ultimate results. A home could move from being "leaky" to being "moderate," or from being "moderate" to being "tight," even if the absolute level of improvement is small. The small improvement might nonetheless be sufficient to push the home over the threshold into the next category of tightness.

Categorization of Final Tightness of Homes

The homes of Georgia REACH Cohort participants were classified into one of three distinct categories of air tightness:

- Leaky;
- Moderate; or

[32] Again, the pre consumption levels are significantly different between participants and non-participants, however, the percent change savings estimate is 12.6% * 969 = 122 therms, which is identical to the original savings estimate. Thus, this adjustment, again, is not necessary.

[33] "Affordability," of course, has an income element to it. Thus, while a home might be considered *more* affordable because of air-sealing efforts, there is no way to determine whether it is affordable without also considering the income of the householder.

- Tight

The homes were classified on all three measures of air tightness: (1) CFM; (2) ACH; and (3) ENIR. The thresholds for each category and measurement were as follows:

Categorization of Home Air Tightness for Georgia REACH Project Energize			
	Tight	Moderate	Leaky
Cubic feet per minute (CFM) /a/	<1500	1501 - 4000	>4000
Air Changes per Hour (ACH) /a/	<5	5 - 10	>10
Estimated Natural Infiltration Rate (ENIR)	<0.35	0.35 - 1.00	>1.00
NOTES: /a/ As determined at a pressure of 50 Pascals.			

Pre-air sealing information was available for 192 of the Georgia REACH Cohort participants. Of those, the 34 homes where post-test reports indicated no change in the measured CFM were excluded from further analysis.[34] The pre- and post-air sealing blower door results for the remaining 158 Georgia REACH Cohort participants are discussed in more detail below. The discussion below focuses on the ACH and ENIR measurements as being the two more significant measurements of the change in the tightness of the home for purposes here.

The homes of Georgia REACH Cohort participants were universally subject to potentially significant air sealing before the blower-door-guided home energy assessment by REACH project staff. None of the pre-treatment Cohort homes were "tight" as measured by either the ACH or ENIR metrics.

Number of Georgia REACH Cohort Homes by Measures of Home Air Tightness *(Georgia REACH Project Energize)*				
	Tight	Moderate	Leaky	Total
Air Changes per Hour (ACH)	0	13	145	158
Estimated Natural Infiltration Rate (ENIR)	0	71	87	158

As is shown above, virtually all Georgia REACH homes were "leaky" when measured by ACH. More than 90% of the homes, in other words, had more than 10 air changes per hour prior to the air sealing efforts. When taking into consideration the type of the housing unit and orientation of the home, the Georgia REACH homes were in moderately better condition prior to the air sealing efforts. Even then, however, a full 55% of the homes were "leaky" as measured by ENIR.

[34] The assumption was made that either no work was done or that the post-test was determined by the home assessment crew to be unreliable for whatever reason.

While the air sealing efforts *improved* the air tightness of Cohort participant homes, the Georgia REACH home energy assessments did not achieve the goal of making Cohort participants homes "tight" from an air leakage perspective. When viewed from the perspective of air changes per hour, the improvements generated by Project Energize in preventing air leakage moved five (5) homes from a classification as "leaky" to a classification as "moderate." All "moderate" homes, however, remained moderate, rather than being moved to the classification of being "tight." On the other end of the spectrum, 140 of the homes that were "leaky" prior to the air sealing efforts remained classified as "leaky" after the air sealing efforts as well. As will be discussed in more detail below --this is not to say that these homes did not experience improvement in their tightness-- in some cases substantial improvement, merely that the magnitude of the improvement was insufficient to change the classification of the air tightness of the home.

Number of Units by Air Tightness Classification of Homes Pre- and Post-Air-Sealing (Georgia REACH Project Energize Cohort Participant Homes)

		Post-Air-Sealing Readings							
		ACH Measurements				ENIR Measurements			
Pre-Air-Sealing Readings		Tight	Moderate	Leaky	Totals	Tight	Moderate	Leaky	Totals
	Tight	0	0	0	0	0	0	0	0
	Moderate	0	13	0	13	2	69	0	71
	Leaky	0	5	140	145	0	17	70	87
	Totals	0	18	140	158	2	86	70	158

A moderately better result obtained when measuring the leakiness of homes through the ENIR metric. While 87 homes were considered "leaky" before the air sealing efforts of Project Energize, only 70 homes were considered "leaky" after the air sealing efforts, with the other seventeen homes moving into the "moderate" classification. In addition, the Project Energize air sealing efforts moved two (2) homes from the "moderate" classification to the "tight" classification.

Improvements in Air Tightness

At first blush, it might appear from these results that the Georgia REACH project did not generate the results it had sought through the air sealing efforts. However, despite the inability of Project Energize to accomplish *all* that it had perhaps hoped to achieve through the air sealing efforts, the project, nonetheless, generated significant *improvements* in the tightness of Cohort participant homes. These improvements are evident through both the ACH and ENIR measurements.

Improvements in the tightness of Cohort participant homes were classified into three categories:

- Slight, involving a reduction in air leakage of five percent (5%) or less;

- Moderate, involving a reduction in air leakage of between five percent (5%) and ten percent (10%); or

- Substantial, involving a reduction in air leakage of greater than ten percent (10%).

The Project Energize air sealing efforts generated impressive improvements in the tightness of Cohort participant homes through its blower-door guided home energy assessments. The air sealing efforts generated significant ACH reductions in 62% of the homes classified as moderately tight on the blower-door pre-tests,[35] with 31% of those homes experiencing "substantial" ACH reduction and 31% experiencing "moderate" ACH reductions. The ENIR improvement was just as effective, with 64% of the homes originally classified as moderately leaky experiencing either a "substantial" (29%) or "moderate" (35%) reduction in ENIR.

The Georgia REACH Cohort participant homes that were originally classified as "leaky" experienced even better results. The ACH reduction was moderate or greater in 70% of those leaky homes, with 41% experiencing a "substantial" reduction in air infiltration. The ENIR reduction was moderate or greater in 65% of those leaky homes, with 45% experiencing a "substantial" reduction in air infiltration.

As can be seen in the table below, the Project Energize air sealing efforts generated the greatest reductions in the leakiest homes. While 41% of the "leaky" homes experienced a "substantial" reduction in air infiltration, only 31% of the "moderate" homes did when measured by ACH. While 45% of the "leaky" homes experienced a "substantial" reduction in air infiltration, only 29% of the "moderate" homes did. Moreover, while a slightly higher percentage of Cohort homes originally classified as "moderate" experienced a "slight" reduction in air infiltration as opposed to a "substantial" reduction, for both the ACH (38% vs. 31%) and ENIR (36% vs. 29%), that was not true for the leaky homes. The proportion of leaky homes experiencing a "substantial" reduction in air infiltration rather than a "slight" reduction was much higher for both ACH (41% vs. 30%) and ENIR (45% and 35%).

[35] No homes were classified as "tight" on the pre-air-sealing blower door tests.

Number of Units by Improvement in Tightness of Home and Pre-Air Sealing Home Tightness Classification							
ACH				ENIR			
Tight				Tight			
Reduction	Slight	0	xxx	Reduction	Slight	0	xxx
	Moderate	0	xxx		Moderate	0	xxx
	Substantial	0	xxx		Substantial	0	xxx
	Total	0	xxx		Total	0	xxx
Moderate				Moderate			
Reduction	Slight	5	38%	Reduction	Slight	24	36%
	Moderate	4	31%		Moderate	23	35%
	Substantial	4	31%		Substantial	19	29%
	Total	13	100%		Total	66	100%
Leaky				Leaky			
Reduction	Slight	43	30%	Reduction	Slight	29	35%
	Moderate	42	29%		Moderate	17	20%
	Substantial	60	41%		Substantial	38	45%
	Total	145	100%		Total	84	100%
Grand total		158		Grand total		158	

In sum, Project Energize cannot be found to have succeeded in achieving the end result of making all homes in which blower door guided air sealing was performed "tight" when measured by air changes per hour (ACH) or Estimated Natural Infiltration Reduction (ENIR). While the air sealing efforts succeeded in improving the tightness of homes sufficiently to move them to an improved categorization of tightness, most homes remained "leaky" even after the air sealing efforts were performed. Despite this, it cannot be concluded that the Georgia REACH air sealing efforts generated no benefits. The vast majority of Cohort participant homes receiving air sealing interventions experienced either moderate or substantial reductions in air infiltration, with a substantially larger number of homes originally classified as "leaky" receiving "substantial" reductions.

REDUCTIONS IN ELECTRIC BILLS FROM CFL INSTALLATION

One of the primary reductions in energy bills accruing from the Project Energize energy efficiency interventions involves the installation of energy efficiency compact fluorescent (CFLs) in Cohort recipient homes. Project Energize staff installed CFLs at the time of the in-home energy assessment. While the number of CFLs installed was generally limited to six units per home, a few number of homes received more than this number.

Number of CFLs Installed in Project Energize Homes (in Instances where Fewer than 15 CFLs Installed)

Number of Installed CFLs	Number of Homes	Number of Installed CFLs	Number of Homes
6	50	10	6
7	1	11	4
8	1	12	5
9	3	13	4

Installing CFLs in Cohort participant homes will generate significant savings on home electric bills. According to Georgia Power Company, replacing a single 100 Watt incandescent light bulb with a CFL equivalent will save between 135 and 81 kWh per year depending on the number of hours the light is used (ranging from three to five in this calculation). Replacing a single 75 Watt incandescent light bulb with a CFL equivalent will save between 53 and 89 kWh per year depending on the numbers of hours the bulb is used (ranging from three to five in this calculation).

Annual kWh Savings from Replacing One Incandescent Light Bulbs with Equivalent CFL (Atlanta (GA)

	Hours of Usage (per week)			Hours of Usage (per week)		
	21	28	35	21	28	35
Incandescent bulb wattage	75	75	75	100	100	100
CFL wattage	20	20	20	26	26	26
kWh Savings per year	100	80	60	135	108	81

With an average price of electricity from Georgia Power being $0.0786 per kWh, as can be seen, customers can save between $5 and $8 per year for each 75 Watt bulb replaced and between $6 and $11 per year for each 100 Watt bulb replaced (depending on the number of hours each bulb is used).

Georgia REACH consumers saved, on average, between $50 and $67 each year depending on whether the CFLs installed through Project Reach replaced 75W or 100W incandescent light bulbs. Over a three year period, the Georgia REACH project generated between $150 and $200 in electric savings (assuming constant electric prices) for its Cohort participants.

This intervention, standing alone, reduced energy bills by significant percentages. In the scenario involving replacement of 100W light bulbs, electricity savings generated dollar savings ranging from 2% to 6% of the household's electricity bill. In the scenario involving replacement of 75W light bulbs, electricity savings generated dollar savings ranging from 2% to 12% of the household's electricity bill.[36]

[36] The distribution of hours of usage was based upon data published by HUD as to assumed hours of lighting usage for low-income residents of housing administered by local housing authorities.

Percentage Electricity Bill Reductions Resulting from Installation of CFLs (Atlanta GA)		
	Replace 75W Bulb	Replace 100W Bulb
< 2%	0	0
> 2% - 5%	42	29
>5% - 10%	29	33
>10% to 12%	3	8
>12% to 16%	0	4
Average dollar bill savings	$49.54	$66.88
Average percentage bill savings	5.0%	6.8%

In addition to generating reductions in energy usage through its air sealing program, Project Energize generated substantive electric bill reductions through the replacement of energy inefficient light bulbs identified through its in-home energy assessment. CFLs installed through Project Energize generated bill reductions of between $50 and nearly $70 each year for REACH Cohort participants.

UTILITY BILL PAYMENT IMPACTS

One key attribute of the self-sustainability of home energy within Project Energize Cohort participants is achieving an ability to make utility bill payments in a full and timely fashion. This section of the impact evaluation examines billing and payment data to determine the extent to which full and timely payments have been made. Project Energize generated positive results in this regard. Georgia REACH participants substantively improved their bill payment outcomes after receiving REACH services.

Payment outcomes have been measured using the following parameters:

- **Complete payment:** If a customer is billed $100, the utility wants to collect $100.
- **Prompt payment:** If a customer receives a bill that is due on the 20th of the month, the utility wants its payment no later than the 20th of the month.
- **Regular payment:** If a customer receives 12 bills in a year, the utility wants 12 payments in a year, one in response to each bill.

The impacts of the Georgia REACH program will be measured below relative to the date on which the in-home energy assessment (and blower-door aided energy audit) were performed. The additional assistance through the group efficiency workshop, budget counseling, referrals to additional public benefit programs, and on-going case management are wrapped into the post-audit period.[37]

[37] Thus, while the discussion below may refer to the impacts of the energy audit, the payment impacts are really a cumulative impact of the energy audit, the appliance replacement, the financial counseling, the energy efficiency

Payment impacts will be assessed through two approaches. First, payment patterns from the post-audit period will be compared to payment patterns in the pre-audit period. Second, payment patterns of post-audit Cohort participants will be compared to the payment patterns of the Georgia REACH control group. The use of these two different approaches will be explicitly noted where appropriate below.

Complete Payments

The most common indicator of whether complete payment have been received from a utility customer involves measuring both the incidence and extent of arrears. The incidence of arrears considers the proportion of the total population in arrears. The extent of arrears is measured by assessing the degree to which dollars of payments each month cover the dollars of current bills.

For this evaluation, arrears were calculated as of the date that a bill was rendered. The presence of arrears was determined by examining whether the posting of a bill for current usage yielded a balance due that was larger than the bill for current usage. If a $50 bill for current usage resulted in a total balance of $85, in other words, the account was deemed to have been carrying a $35 arrears.

The alternative to examining arrears at the time of a bill is to consider whether arrears remain on an account at the time a bill *payment* is posted. This approach was not used for several reasons. First, some REACH customers make multiple payments in a month. Arrears at the time of any one payment, therefore, would misstate the level of arrears the customer was carrying from month-to-month. Second, many payments for REACH customers represent energy assistance payments. These payments are not intended to be tied to any particular monthly bill. While a $300 energy assistance payment in November may yield a bill credit the following month, that bill credit does not accurately represent the affordability of winter home energy bills to that customer. Third, the question with arrears is not what arrears exist at any given point in time, but rather what arrears are carried from one month into the next month. That determination can only be made by looking at the arrears appearing on the next month's bill. Finally, while every account, by definition, has a bill each month, not every account has a payment each month. Examination of the arrears appearing on bills thus uses the fullest range of available data.

Current bill coverage index: The provision of Georgia REACH services appears to substantively increase the completeness of bill payment within the Cohort population. Figure 1 below presents an index of the extent to which the dollars of payments "cover" the dollars of current bills for the six months before and after the Project Energize home energy audit. The dollars of bills and dollars of payments have been aggregated for purposes of this analysis. If the current bill coverage index is exactly 1.0, payments made in the study period exactly equal the bills for current service in that period. If the index is less than 1.0, payments are less than the current bill and the accounts are falling further into arrears. If the index is more than 1.0, payments are not only covering the current bill, but are retiring arrears as well.

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education, the public benefit referrals, and all other REACH interventions. References to the impacts of "the energy audit" are intended to merely be shorthand for this cumulative set of delivered REACH services.

The figure below compares the post-treatment current bill coverage index to the current bill coverage index in the treatment month along with the average current bill coverage index for the four months prior to a Project Energize audit. The average cumulative current bill coverage index for the four months prior to a Project Energize audit was 0.98 for Cohort participants. As can be seen from Figure 1, starting in the first month after the Project Energize energy audit, Cohort participant payments went from being less than the current monthly bill in the pre-treatment period to being more than the current monthly bill post-treatment. In the first post-treatment month, the current bill coverage index was 1.05. In each post-treatment month, the index was greater than 1.0. By the fourth month after the audit, the current bill coverage index was still at 1.03, a five percent (5%) improvement over the average index for the four months immediately preceding the energy efficiency audit.

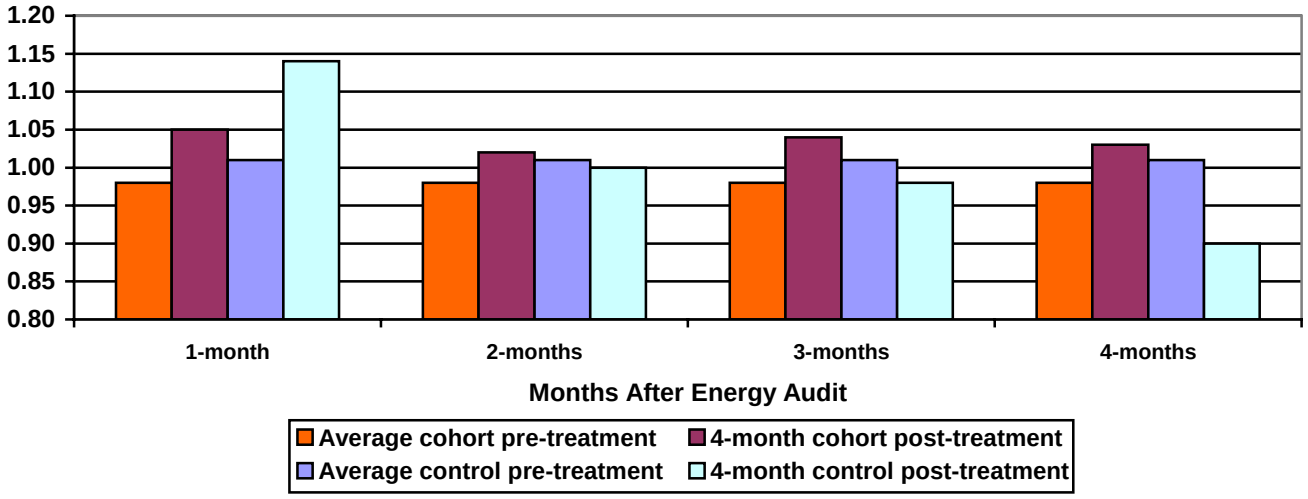

Figure 1. Current bill coverage index: Project Energize Cohort and control pre- and post-treatment

In contrast, the average current bill coverage index for the control group was 1.01 for the four months before the imputed treatment date.[38] By the fourth month after the imputed control treatment date, the current bill coverage index for the control group had declined to only 0.90, a deterioration of 10%. The net improvement in the cohort group's current bill coverage index was thus 15% over the first four months after the treatment.

The incidence of arrears: The provision of Georgia REACH services appears to substantively reduce the incidence of arrears in the low-income population. Figure 2 below presents a comparison of the percentage of bills having arrears in any given month. In this analysis, it is assumed that every account receives one, but only one, bill in a given month. The number of bills thus reflects the number of accounts in each population in each month.

As with other analyses, this comparison examines the performance of the group of Cohort participants relative to the group of control participants with an imputed treatment date. The

[38] As described in detail above with respect to the energy usage analysis, a mean treatment date was calculated and used for the control group. This allows an analysis of the payment effects of the energy audit over similar time frames.

imputed treatment date is the mean date on which Cohort participants received the blower-door aided energy audit (and air sealing interventions).

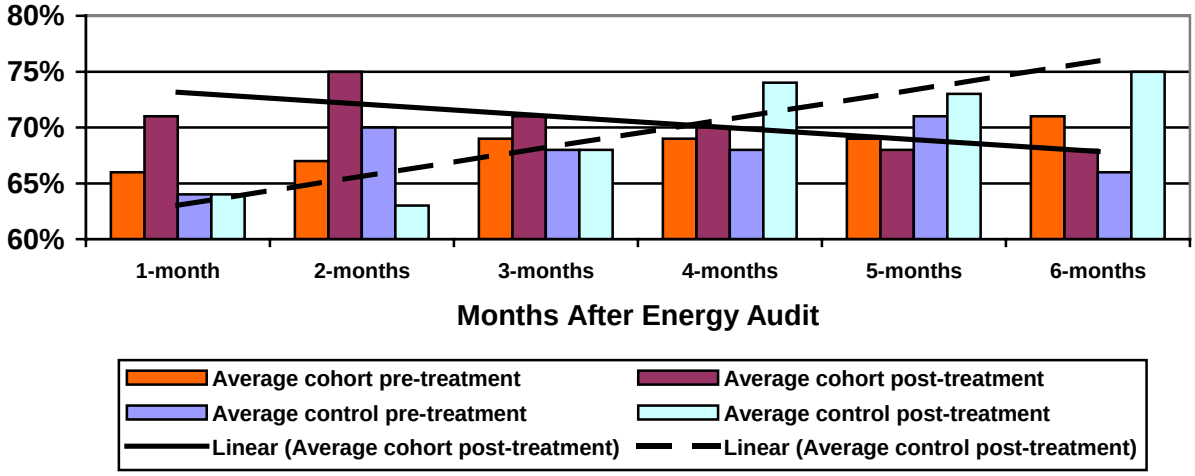

Figure 2. Percentage of Cohort and Control participants with arrears pre- and post-treatment

In addition to the data for six months pre-treatment and six months post-treatment, Figure 2 calculates a trend line in the percentage of accounts that received a current bill in each month while having an arrears appear on that current bill.[39] While the percentage of pre-treatment accounts with arrears was virtually identical for the control and Cohort populations, the post-treatment results differed substantially. While 71% of the Cohort accounts were in arrears in the treatment month (i.e., the month the household received the REACH energy audit), by the sixth post-treatment month, that percentage had decreased to only 68%, an improvement of 3%. In contrast, while 66% of the control group was in arrears in the imputed treatment month (as defined above), by the sixth post-treatment month, the percentage of control accounts in arrears had increased to 75%. The net change in the percentage of Cohort accounts in arrears indicates a reduction of 12% in the percentage of Cohort accounts in arrears.

The data above supports the conclusion that Project Energize has, on a pre-treatment/post-treatment comparison basis, helped Cohort participants reduce the incidence and level of arrears that those participants have historically experienced.

Prompt Payments

The promptness of bill payment considers not merely whether a customer pays his or her utility bill in full, but whether the customer pays his or her utility bill on time on a monthly basis. If a utility renders a bill for $100, that company wants a customer to pay the bill by the due date as well as paying the bill in full.

Payments resulting in $0 balances: Bill payment promptness below is first measured by examining the number of payments that result in a $0 balance. If payments reduce the bill balance to

[39] Similar trend lines were calculated for the pre-treatment control group and pre-treatment Cohort population. Those pre-treatment trend lines lay virtually on top of each other.

$0 on a monthly basis, the payments are more "prompt" than if payments allowed to build on a monthly basis, only to have those arrears then retired on an occasional basis.

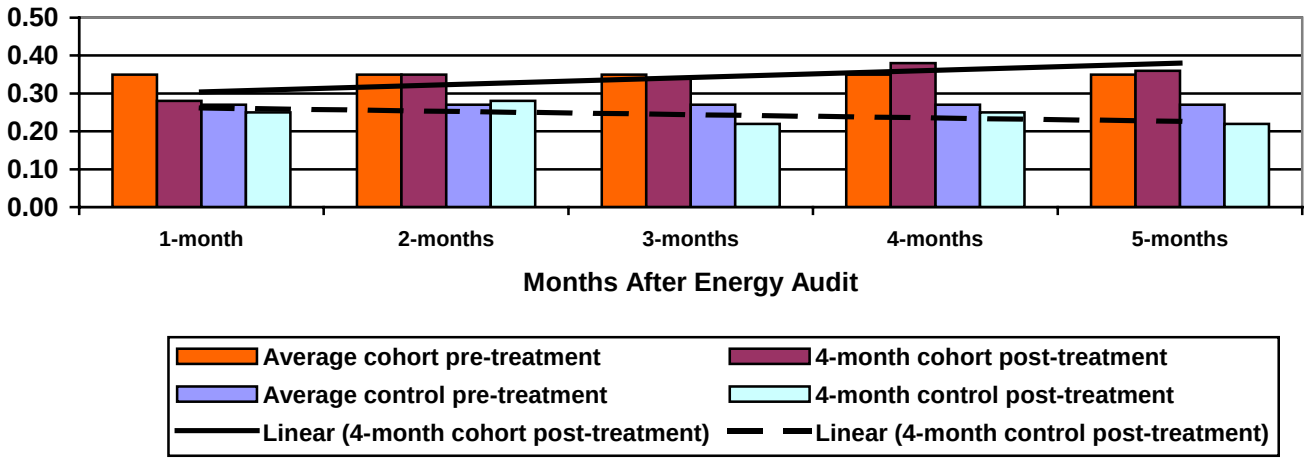

Figure 3.Ratio of payments yielding $0 balance to total bills for Cohort and control pre- and post-treatment

Cohort participants demonstrated a substantive net increase in the proportion of bills that resulted in a payment yielding a $0 balance in the next month. If there is a $0 balance forward, the account has no arrears (meaning the bill has been paid in the month in which it was rendered). Cohort participants experienced an average $0 balance ratio of 0.35 over the four months prior to receiving the Georgia REACH energy audit. While the ratio dipped in the first month after treatment, by the fourth month, the ratio had increased to 0.38. The ratio remained at 0.36 in the fifth month after treatment.

In contrast, control participants experienced an average $0 balance ratio of 0.27 in the four months prior to their imputed treatment date. Rather than seeing an increasing $0 balance ratio, however, the control group experienced a reduction in the ratio to 0.22 in the third and fifth months after the treatment (and 0.25 in the fourth month).

Georgia REACH cohort recipients experienced a net increase of 0.06 in the proportion monthly payments yielding a $0 balance.

Payment-to-current bill ratio: The second measure of the timeliness of payments involves a corollary to the current bill coverage index. This measure examines the extent to which Georgia REACH participants make payments each month that equal or exceed their current bills.[40] If the payment meets this criterion, the account has made a timely payment toward at least its current bill. It is not falling into arrears (or falling further into arrears). To the extent that payments do not equal or exceed the current bill, the account is developing further

[40] This metric differs from the metric looking at whether a payment results in a $0 balance. A payment can equal or exceed the current bill whether or not it pays the entire account balance.

arrears (meaning that the account is not timely paid on a monthly basis). This analysis is limited to those accounts that have both current bills and payments in any given month.[41]

Georgia REACH cohort participants experienced an improvement in the proportion of payments that equal or exceed the current bill relative to what would have been experienced in the absence of the program. The average proportion of Cohort payments that equal or exceed the current bill in the four months prior to a Project Energize energy audit was 0.67. While there was a slight dip in these payments in the third month subsequent to the energy audit, the proportion of payments in subsequent months stayed nearly constant, ranging between 0.66 in months 2 and 5 after the energy audit and 0.67 in month 4.

In contrast, as shown in Figure 4, there was a measurable deterioration in this payment pattern for Georgia REACH control participants. While the average proportion of control payment exceeding current bills in the four months prior to the imputed treatment date was 0.48, there was a steady decline in that proportion in the subsequent months. By month 3 after the imputed treatment date, the proportion had fallen to 0.46, while in months 4 and 5 the proportion had fallen to 0.37 and 0.36 respectively, a decline of 0.12.

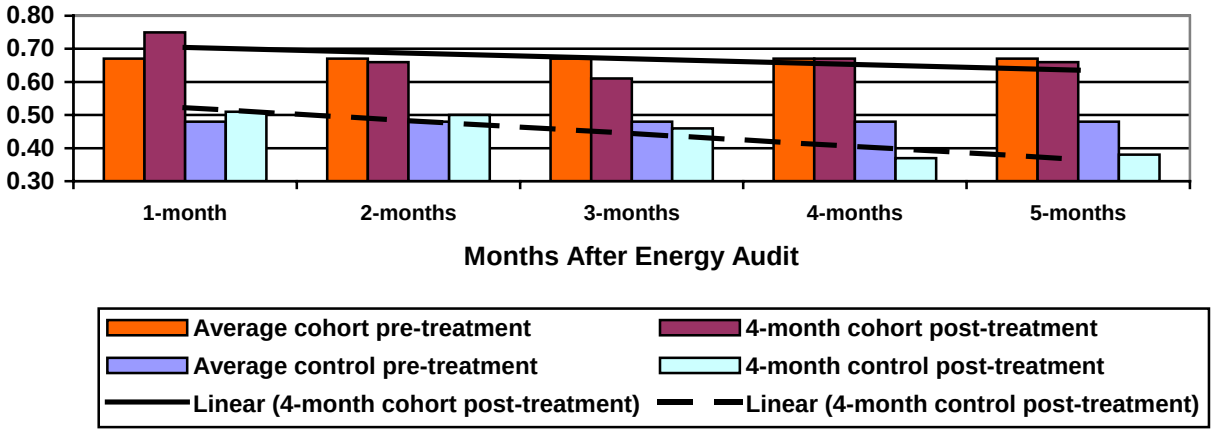

Figure 4. Ratio of payments greater than current bill to total bills for Cohort and control pre- and post-treatment

While it is clear that the Georgia REACH program interventions did not result in an increase in the number of payments that equal or exceed the current bill, the program resulted in an improvement in current bill payments relative to what would have been experienced in the absence of the program. The program generated a net improvement of 0.11 in the proportion of payments that equal or exceed the current bill each month.

Regular Payments

An examination of the regularity of bill payment measures a different aspect of a customer's payment profile than does an examination of customer arrears. A customer may maintain a relatively low level of arrears by paying multiple months of bills on an infrequent basis. An

[41] The extent to which accounts do or do not make payments is considered under a separate metric.

examination of January arrears, for example, does not distinguish between the customer that has made his or her last twelve monthly payments on time and in full, the customer that has made $0 in payments during August through October (perhaps waiting for the annual LIHEAP benefit to pay off those arrears), and the customer who makes three payments over the year of amounts equal to the total annual bill. The regularity of payments can be directly measured.

Payment-to-bill index: The regularity of payments can be measured by indexing the total number payments to the total number of bills rendered each month. A payment-to-bill ratio of 1.0 means that for every bill that is rendered, exactly one payment has been received. More meaningful is to conclude that for every ten (10) bills rendered, ten (10) payments have been received. A payment-to-bill ratio of 0.8 means that for every ten bills rendered, eight payments have been received.

The payment-to-bill ratio does not consider the size or "completeness" of a payment. Measuring the completeness of payment is accomplished through other aspects of the customer payment profile. The regularity of bill payment is considered important because of the generally accepted proposition that if "some" payment is made on an account in any given month, there is an increased likelihood that the customer will be able to make a future payment sufficient to reduce the account balance to $0. The April bill is easier to pay in full, in other words, if the customer has made *some* payment toward the March bill, even if that March payment is only a partial payment.[42]

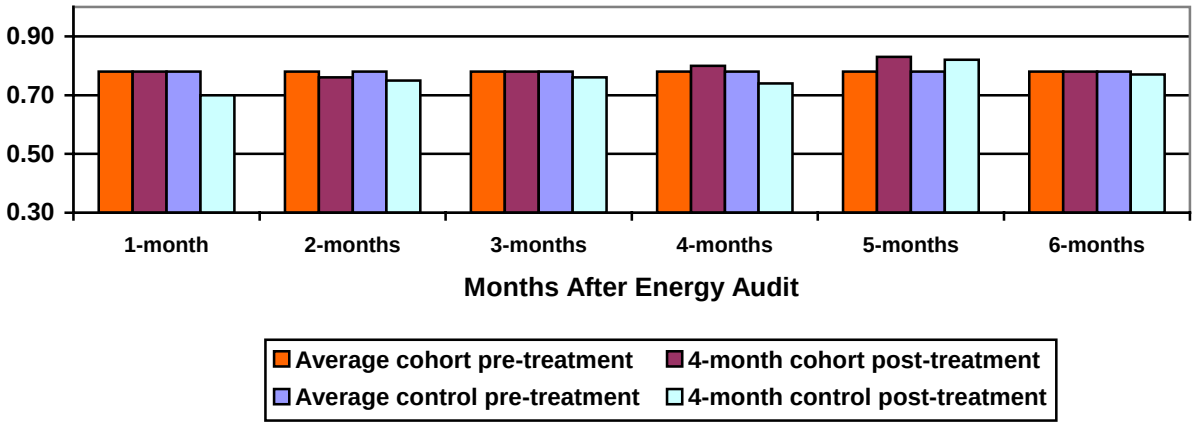

Figure 5. Payment to bill ratio for Cohort and control pre- and post-treatment

There was a substantive improvement in the payment to bill ratio for Georgia REACH Cohort participants subsequent to the receipt of a Project Energize home energy audit. The average pre-treatment payment-to-bill ratio for both Cohort and control participants was 0.78. This means that for every 100 bills rendered to a REACH customer, the utility received 78 payments in return (in the month the bill was rendered). Setting aside the slight peak in payments five months after the energy audit for Cohort participants, the ratio of payments-to-bills remained

[42] The same can be said, of course, about cooling load. The September bill is easier to pay in full if *some* payment has been made toward the August bill.

nearly constant. As is illustrated in Figure 5, the ratio varied with a narrow band between 0.76 to 0.80, with most months remaining at the average pre-treatment level of 0.78.

The same can not be observed about the control population. The proportion of payments-to-bills for the control population was less than that of the Cohort population in five of the six post-treatment months. Moreover, there was more variation in the payment-to-bill ratio for the control population. The ratio dropped significantly in month 1 (from 0.78 to 0.70). In contrast, there was a slight peak in month 5 (up to 0.82). In the remaining four months, the payment-to-bill ratio ranged from 0.74 to 0.77, all below the four month pre-treatment average.

The data supports a conclusion that there was a slight, but measurable, improvement in the payments-to-bills ratio for Georgia REACH cohort participants. Not only did the payment-to-bills ratio increase, but also the monthly volatility in payments-to-bills was reduced.

Summary

In sum, the Georgia REACH program interventions substantively improved the utility bill payment outcomes for the program's Cohort participants. Payment outcomes were considered for the full range of a payment profile for the REACH participants. The profile included the completeness of payment, the timeliness of payments, and the regularity of payments. While the improvement in the regularity of payments was subtler and less substantive than other payment metrics, across-the-board, Georgia REACH Cohort participants improved their utility bill payment patterns as a result of program interventions.

ENERGY EFFICIENCY TRAINING

In addition to generating measurable energy savings through a combination of the energy efficiency interventions discussed throughout (e.g., air sealing, appliance replacement, energy education), one of the goals of Project Energize was to raise the level of energy efficiency awareness and educational levels among the Project Energize Cohort population. Education is portable. It can be applied in any situation, in any home. Energy education can help a household save energy whether that household stays in the same home or moves. As discussed in detail in Chapter 2, one of the energy education interventions was to provide group training through an energy efficiency workshop staffed by the Southface Institute (of Atlanta).

To measure the educational impact of the REACH energy efficiency workshops, workshop attendees completed a "test" both at the beginning of the workshop (hereafter "pre-test") and at the end of the workshop (hereafter "post-test"). The change in the number of correct responses was used to measure the educational impact of the workshop.[43] The discussion below focuses on the responses to the "before" and "after" questions. The discussion examines improved response rates for individual questions as well as improved aggregate scores.[44] Before looking at individual questions, some observations about overall composite scores are proffered.

[43] In all but one of the workshops, the pre- and post-tests involved 15 questions. To allow ready comparison of results, the workshop using a 12 question pre- and post-test is excluded from this discussion.
[44] No effort is possible to gain insights into the *persistence* of any knowledge gain generated by the workshops.

Overall Composite Scores Before and After the Workshop.

REACH participants had modest knowledge about energy use in their homes prior to attending the energy efficiency workshops. In the pre-test of energy knowledge, a full ten percent (10%) of the workshop participants (15 of 146) correctly answered between six (6) and eight (8) of the 15 pre-test questions. No one correctly responded to fewer than six questions. Exactly 30% of the workshop attendees (44 of 146) correctly answered between six (6) and ten (10) of the 15 pre-test questions. In contrast, fewer than 10% of the seminar attendees (12 of 146) correctly answered either 14 or 15 of the 15 pre-test questions.

The seminar resulted in significantly improved scores. In the post-seminar test, attendees correctly answered a minimum of eight (8) of the 15 post-test questions.[45] All scores of six (6) or seven (7) had been improved. Moreover, in contrast to the 44 attendees who answered 10 or fewer questions correctly in the pre-test, only 17 attendees correctly responded to ten (10) or fewer questions in the post-test.

The seminar improved REACH participant knowledge to allow substantial improvements in the highest test scores. Twelve seminar attendees scored a perfect 15 correct responses in the post-test (compared to two (2) scoring perfect 15s in the pre-test). While twelve REACH participants scored either 14 or 15 in the pre-test, 40 did in the post-test. While 36 REACH participants scored 13 or higher in the pre-test, 83 scored 13 or higher in the post-test. The table below shows the movement in scores between the pre- and post-tests.

Post-Test Scores by Pre-Test Scores in Georgia REACH Energy Efficiency Trainings

		Pre-Test Scores									
		6	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Post-test Scores	**6**	0	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0	0
	8	0	1	1	1	0	1	0	0	0	0
	9	0	2	0	0	2	1	0	0	0	0
	10	0	3	0	1	0	1	3	0	0	0
	11	1	3	2	4	2	2	1	1	0	0
	12	0	0	1	3	2	6	9	8	1	1
	13	1	0	0	2	4	15	12	5	2	1
	14	0	0	0	3	4	6	4	7	4	0
	15	0	0	0	0	1	4	1	3	3	0

As can be seen, the seminar helped substantially improve scores on the post-test. Of the REACH participants scoring 12 or more on the post-test (113 of 146), 52 improved their score by either one (1) or two (2) questions, while an additional 24 improved their score by either three (3) or

[45] The post-test questions were identical to the pre-test questions.

four (4) questions. Six (6) workshop attendees improved their score by five (5) questions or more.[46]

Increased Number of Correct Answers on Post-Test by Score on the Pre-Test
Georgia REACH Energy Efficiency Training

Increased Number of Correct Answers	Post-Test Scores				
	12	13	14	15	Total
<0	10	3	0	0	13
0	9	5	4	0	18
1	6	12	7	3	28
2	2	15	4	3	24
3	3	4	6	1	14
4	0	2	4	4	10
5	0	1	3	1	5
6	0	0	0	0	0
7	0	1	0	0	1
Total	30	43	28	12	---

To gain some *overall* notion of the aggregated improvement in test scores, it is possible to determine the total percentage of pre- and post-test questions that were correctly answered by workshop participants. There were a total of 2,190 possible correct answers on both tests for the 146 attendees providing both a pre- and post-test (15 questions per test x 146 respondents = 2,190 potential responses). Of that total:

- 1,621 (74%) of the pre-test questions were correctly answered (569 incorrectly answered); and
- 1,823 (83%) of the post-test questions were correctly answered (367 incorrectly answered).

As can be seen, more than one-third of the incorrect responses (202 / 569 = 36%) were eliminated by the Georgia REACH half-day training.

With this overview of the overall effectiveness of the Georgia REACH energy education workshops, we turn next to some of the individual components of the education and how well or poorly workshop attendees performed on a pre- and post-test basis.

[46] Thus, for example, four attendees scoring 15 on the post-test improved their score by four correct answers (*i.e.*, they scored 11 on the pre-test). Of the 43 persons that scored 13 on the post-test, 12 improved their score by one (1) relative to the pre-test (*i.e.*, they scored 12 on the pre-test).

Scores on Individual Questions Regarding Home Energy Usage

Workshop attendees showed significant improvement on six of the fifteen questions designed to measure the effectiveness of the Georgia REACH energy efficiency training. For purposes of this discussion, a "significant improvement" is defined as a question for which ten (10) or more additional attendees correctly responded to the question on the post-test as compared to the pre-test.

- The biggest improvement came in knowledge about taking showers rather than baths. 28 more workshop attendees (105 vs. 77) correctly responded that taking a shower tends to use less hot water than does taking a bath. Despite this significant improvement in the correct response rate, this question was still one of the most poorly scored of the 15 questions (ranking #12 of 15 in the rate of correct response).

- The second greatest improvement came in the knowledge exhibited regarding warming a cold home. 24 more workshop attendees correctly responded that a home does *not* heat more quickly if the thermostat is set higher (*e.g.*, 80 degrees rather than 70 degrees). Overall, 130 of the 147 workshop attendees completing the post-test answered this question correctly, up from 106 correct responses on the pre-test. On the post-test, this question was in the mid-range of correct scores, ranking eighth in the most commonly correctly answered questions.

- The third greatest improvement came in knowledge about the benefits that households derive from lowering household utility bills. 22 more REACH participants correctly answered on the post-test that lowering utility bills generated benefits beyond simply saving money. Of the 147 post-test respondents, 122 provided the correct response (making the question the 11th most commonly correctly answered question).

- The fourth greatest improvement came in knowledge about how an electric bill is calculated. In the post-test, 124 seminar attendees answered correctly that it was *false* that electric bills are based on the average of all electricity used in a particular geographic area. This question was the 10th most frequently correctly answered question.

- The fifth greatest improvement came in knowledge about saving money on utility bills. Fourteen (14) more people correctly answered that it was *false* that the only way to save money on utility bills is to pay lower rates. Overall, 128 of the 146 seminar attendees answered this question correctly on the post-test, up from 114 on the pre-test. The question was still not in the upper tiers of most commonly correctly answered, ranking 9th out of 15 question on the post-test.

- The sixth greatest improvement came in knowledge about water and sewer rates. Eleven (11) more people answered correctly that, unless they were on a septic system, their water bills included sewer charges as well. This question was the second most

commonly correctly answered question on the post-test, with 144 of 146 workshop attendees getting it correct (compared to 133 correct responses on the pre-test).

Despite the overall success of the training, several questions still revealed substantial information gaps for workshop participants, with fewer than 100 of the 146 attendees providing correct responses on the post-test.

- Only 76 workshop attendees correctly answered that it was ***false*** that a toaster oven uses less energy than a microwave to cook two potatoes;

- Only 95 of the workshop attendees correctly answered that it was ***false*** that it takes less energy to wake up to a warm house if one leaves your home at the daytime temperature rather than setting it back at night;

- Only 96 workshop attendees correctly answered that it was ***true*** that utility expenses, including the refrigerator, can be as high as the costs of heating for a typical household in the course of a year.

The most commonly correctly answered question in both the pre- and post-test involved the recognition that one need not wash clothes in hot water in order to get them "really clean."

Several conclusions march forward from the discussion above. Georgia REACH participants prior to receiving the Southface training[47] had modest knowledge of energy efficiency in the home. The provision of the one-half day Georgia REACH workshop training substantially improved this energy efficiency knowledge. The REACH training eliminated one-third of incorrect responses. Despite the fact that some gaps in energy efficiency knowledge remained after receiving training, workshop attendees significantly improved their scores on questions about energy use and energy efficiency in the home. Georgia REACH staff was pleased with the impact that the Southface Institute workshops had on the knowledge level of REACH participants.

[47] Each workshop participant would likely have received a one-on-one training prior to the workshop at the time of the Project Energize home assessment.

CHAPTER 4: PROJECT FINDINGS

Based on the data and discussion above, the following factual findings are proffered for the Georgia REACH Project Energize program administered by Partnership for Community Action.

PROGRAM SERVICES

1. One key activity in the delivery of energy efficiency services to Georgia REACH participants was the delivery of individualized energy education.

2. Project Energize family advocates worked with family members to identify historical spending patterns and to prepare a future family budget. Family advocates also discussed income with the household and made appropriate referrals where necessary and appropriate to supplement household income.

3. Project Energize devoted a limited amount of program funding to the payment of pre-existing utility arrearages in order to allow Cohort participants to free themselves of arrears that would make future bill payments unaffordable, even given usage and bill reductions attributable to the energy efficiency interventions directed toward the households. REACH family advocates helped Cohort participant households negotiate deferred payment plans for pre-existing arrears.

4. A less individualized, but nonetheless major source of energy efficiency training was provided through a formal group workshop presented by Southface Institute, one of the region's leading energy efficiency nonprofit organizations.

5. The Georgia REACH program invested considerable dollars in infrastructure improvements to the homes of Cohort participants in addition to providing energy education. The efficiency improvements came in the form of air sealing efforts (and the installation of other low-cost conservation measures) at the time of the home energy assessment. In addition, some major appliance replacement was funded.

6. During the six month period of program participation, Project Energize family advocates made periodic contact with the Cohort participants to assess whether the households were succeeding in the household budget and spending plans they had developed in collaboration with the family advocate, whether questions had arisen about energy usage or energy savings issues, or whether some other type of family crisis (*e.g.*, loss of job) had arisen that might benefit from outside intervention.

PROCESS EVALUATION

7. The overall Project Energize Process consisted of four basic steps. Outreach and enrollment was the first step. The second step involved an initial interview and discussion of household finances. The third step involved the delivery of an in-home energy assessment. The fourth step involved maintaining ongoing contact between the Project Energize family advocates and each of the Cohort participants.

8. Outreach for Project Energize was focused almost exclusively on households that submitted applications for energy assistance through the federal Low-Income Home Energy Assistance Program (LIHEAP). Using the LIHEAP application process facilitated the REACH outreach activities since project staff were assured that the household would be income eligible. Other REACH program criteria, particularly whether the household had children as well as whether the household had lived in the same home for at least twelve (12) months, severely limited program participation.

9. Efforts to initiate conversations about household finances, and household budgeting in particular, was "not well received" at the time of the initial in-office interview at the time of intake. Going into the home was a critical component to the budget counseling. Going into the home made the process "more personal," "allowed people to share" more freely, and allowed families to "feel more comfortable" and "more free to talk" about their personal finances as they sat in their own homes.

10. Committing household budgets and money management plans to paper was as important as developing the budget. Households appeared to take more ownership in a written budget that was memorialized in some semi-formal fashion rather than simply orally agreed to.

Risk Assessment

11. As part of its holistic approach to helping clients address their home energy affordability problems, the Georgia REACH project engaged a Risk Assessment Matrix. This Matrix allowed the REACH family advocates to identify a full range of issues arising as a result of home energy unaffordability. The family advocates could then not only address the energy issues through energy-specific interventions, but also address the corollary issues to enhance the effectiveness of the energy interventions.

12. The energy corollaries that were most commonly identified by the REACH family advocates within the Georgia REACH Cohort population included carrying utility arrears and paying late payment charges, experiencing high winter bill burdens, experiencing a non-weatherized home, experiencing a lack of control over expenses, experiencing an inability to respond to exigencies, and living with old and inefficient appliances. By far the most commonly identified risk, however, was simply that the household's income was insufficient.

13. Of the non-energy risks, those associated with employment (or the lack thereof) and children predominated.

14. Energy-related risks were common to all levels of Federal Poverty Level within the Georgia REACH Cohort population. The percentage of all risks involving "energy risks" was roughly equal between Poverty Levels.

15. The specific types of energy risks identified, however, differed markedly between income levels. For example, households at the lowest Poverty Level identified high winter burdens proportionately *less* often than did their higher income counterparts. In contrast, the lowest income households identified a "lack of control over expenses" proportionately *more* often than did their somewhat higher income counterparts.

16. Unlike the Poverty Level analysis, the types of risks identified for households did not substantially vary by the type of income deficit reported by the household. Certainly, no pattern emerges indicating that the energy risks facing Georgia REACH Cohort participants became either more frequent or more intense as the household's income deficit became bigger.

17. Georgia REACH Cohort participants characterized the risks they faced based on six attributes. Having no control over expenses provided the grimmest picture, with this risk being rated long-term, foreseeable, big, uncontrollable, and regular. High winter bill burdens were rated as a foreseeable, big, uncontrollable risk, but also as a short-term, temporary and occasional risk. Carrying utility arrears (and paying late payment charges) was rated as long-term, foreseeable, big and regular. Carrying arrears, however, was also rated as controllable and temporary.

18. The Georgia REACH project responded to each of these identified risks by identifying an intervention designed specifically to address the risk. The interventions, however, could easily *differ* as between households, since the interventions were intended to respond to the specific circumstances of the household.

19. Targeting interventions tailored to the specifically-identified risks facing a household is an intense, and more expensive, proposition than delivering more generic energy assistance (either cash or efficiency investments). Nonetheless, the experience of the Georgia REACH project supports the conclusion that the adverse impacts of unaffordable home energy bills can manifest themselves as other than an "energy" problem. The experience of Project Energize supports the conclusion that targeted, tailored, household-specific interventions are an important aspect of responding to home energy unaffordability.

Home Energy Insecurity Scale

20. The Home Energy Insecurity Scale was used by Project Energize to measure the extent to which the Georgia REACH program improved the energy self-sufficiency of its low-income participants. The Home Energy Insecurity Scale can be used to quantitatively measure outcomes for home energy assistance programs such as REACH. The Scale proved to be an important supplement to traditional measurements of the impacts generated by low-income energy assistance programs.

21. The first survey generally took roughly ten minutes to complete at the time of program intake and was not resisted by the program applicant.

22. The second Home Energy Insecurity Survey was completed at the time of the "exit interview" with each Cohort participant. For control participants, family advocate staff sought to make telephone contact in order to complete the second survey. These efforts to make telephone contact, however, frequently failed. Staff reported that many control participants had moved, had telephone service disconnected, or had otherwise lost contact with the REACH program. Even though final payment of a financial incentive for participating as a control group member was withheld pending this final contact, no second contact was made with the bulk of control group participants. Future programs need to investigate new ways --either through improved procedures or through higher incentives-- to ensure the completion of both first and second Home Energy Insecurity Surveys.

Client Satisfaction

23. Participants in Project Energize provided overwhelmingly favorable responses to the program through the exit interviews.

24. 120 of the 136 households participating in the exit interview said that they "strongly agree" when asked whether Project Energize provided the services that were explained during the intake process.

25. 114 of the 136 households participating in the exit interview said that they "strongly agree" when asked whether Project Energize met their expectations.

26. 123 of the 136 households participating in the exit interview said "strongly agree" when asked whether Project Energize staff were caring, professional, knowledgeable and friendly.

27. 114 of the 136 households participating in the exit interview said that they "strongly agree" when asked whether the household would continue to use the energy saving measures learned through Project Energize in the future.

28. The only possible component of Project Energize where satisfaction lagged involved the impact of the program on the total family. Only 74 of the households participating in the exit interviews responded "strongly agree" when asked whether Project Energize benefited the participant's children and made the children more energy conscious. In addition, 54 participants "agreed" that Project Energize benefited the children, while eight (8) Project Energize participants "disagreed" that the program benefited their children and made them more energy conscious. The efforts to encompass the entire family in Project Energize initiatives perhaps fell short of program expectations.

29. When providing unaided answers to open-ended questions in the exit interviews, Project Energize Cohort participants emphasized the conclusion that the intense interventions, and ongoing working relationships between project staff and the program's Cohort participants lay at the heart of the program. Of the 104 persons providing a response to

the open-ended question about what respondents "liked best" about Project Energize, 61 provided a comment that explicitly cited the Project Energize staff.

30. While the list of quoted comments in the narrative is lengthy, each of these specific staff-related comments standing alone --and certainly the sum of these comments when considered in their totality-- support the conclusion that Project Energize accomplished one of the major objectives of the Georgia REACH program. Early in its REACH application, the State of Georgia said that what Project Energize was all about was to "systematically assess and identify the areas and levels of risk the family faces, assist the family in setting and working toward concrete goals, and combine supportive relationships with tangible help." It is impossible to review the exit interviews provided through Project Energize and conclude that the program did anything but accomplish that objective.

31. Project Energize operated largely as intended. The program delivered the services it had promised to deliver. While not without the occasional problem, Project Energize appears to have been adequately staffed, properly trained, and appropriately implemented (including both administration and oversight).

IMPACT EVALUATION

32. The broad objective of Project Energize was to assist participant households move toward energy self-sufficiency. "Self-sufficiency," however, is a squishy concept at best. The concept can be operationalized through the impact evaluation measures discussed below.

Home Energy Insecurity

33. The Georgia REACH program generated positive impacts on improving the self-sufficiency of program participants. Georgia REACH Cohort participants improved their performance on the Home Energy Insecurity Scale more frequently, and to a greater extent, than did the Georgia REACH control participants.

34. The REACH Cohort group generated "thriving" households, while the control group did not. The REACH Cohort population generated far more "capable" households than did the control group. The REACH Cohort population succeeded in removing households from their vulnerable status.

35. The REACH Cohort population experienced a greater increase in home energy stability than did the control group. Twice as many Cohort participants as control participants experienced an improved Home Energy Insecurity status. However, even though the Georgia REACH Cohort population removed most households from their "in-crisis" status, others Cohort households fell into crisis during the program.

36. The Georgia REACH program helped to *improve* the Home Energy Insecurity status of the program's Cohort participants even if that improvement did not move those participants completely into the "capable" or "thriving" categories. A sharp improvement

was particularly found in moving Cohort participants out of the "in-crisis" and "vulnerable" categories and into more secure, more self-sufficient, Home Energy Insecurity classifications. Whether or not the program succeeded in moving Cohort participants to the ***highest*** category, it did, indeed, succeed in improving the self-sufficiency of Cohort participants.

37. The Georgia REACH Cohort population significantly increased its overall self-sufficiency after receipt of the REACH interventions. In contrast, the Georgia REACH control population experienced no change in its overall self-sufficiency during the time of the REACH program.

38. The Georgia REACH Cohort participant population begins to approach a level of having all households, on average, rate "stable" on the aggregate index. The REACH program improvement (0.08) eliminated nearly half of the gap (0.19) between the beginning Home Energy Self-Sufficiency Index and an ending Home Energy Self-Sufficiency Index representing an average categorization of stable.

39. One would have expected within the Georgia REACH Cohort population to see a reduction in the number of multiple indicators supporting the classification of households into thresholds indicating a lack of self-sufficiency. Even if the REACH interventions were insufficient to allow a household to improve their Home Energy Insecurity status by moving up one or more thresholds, the interventions should have been able to help those households resolve at least ***some*** of their energy-related self-sufficiency problems. This is precisely what appears.

Energy Usage Reductions

40. The combination of energy efficiency interventions had a substantive impact on the energy consumption of Georgia REACH participants. The energy impact of the REACH Program was calculated for both the electric and natural gas program participants.

41. The Georgia REACH program generated an average net reduction in electricity consumption of 835 kWh or 5.7% of the average pre-participation normalized annual consumption (when comparing Cohort and control populations).

42. The Georgia REACH program generated a net savings of 122 therms, or 12.6% of the average pre-participation normalized annual consumption (when comparing Cohort and control populations).

Blower-Door Aided Leakage Reductions

43. The homes of Georgia REACH Cohort participants were universally subject to potentially significant air sealing before the blower-door-guided home energy assessment by REACH project staff. None of the pre-treatment Cohort homes were "tight" as measured by home "leakiness" metrics. One primary metric used involved Air Changes per Hour (ACH).

44. While the air sealing efforts *improved* the air tightness of Cohort participant homes, the Georgia REACH home energy assessments did not achieve the goal of making Cohort participants homes "tight" from an air leakage perspective. When viewed from the perspective of air changes per hour, the improvements generated by Project Energize in preventing air leakage moved five (5) homes from a classification as "leaky" to a classification as "moderate." All "moderate" homes, however, remained moderate, rather than being moved to the classification of being "tight." On the other end of the spectrum, nearly all of the homes that were "leaky" prior to the air sealing efforts remained classified as "leaky" after the air sealing efforts as well.

45. This is not to say that these homes did not experience improvement in their tightness-- in some cases substantial improvement, merely that the magnitude of the improvement was insufficient to change the classification of the air tightness of the home. Despite the inability of Project Energize to accomplish *all* that it had perhaps hoped to achieve through the air sealing efforts, the project, nonetheless, generated significant *improvements* in the tightness of Cohort participant homes.

46. The Project Energize air sealing efforts generated impressive improvements in the tightness of Cohort participant homes through its blower-door guided home energy assessments. The air sealing efforts generated significant ACH reductions in 62% of the homes classified as moderately tight on the blower-door pre-tests, with 31% of those homes experiencing "substantial" ACH reduction and 31% experiencing "moderate" ACH reductions.

47. The Georgia REACH Cohort participant homes that were originally classified as "leaky" experienced even better results. The ACH reduction was moderate or greater in 70% of those leaky homes, with 41% experiencing a "substantial" reduction in air infiltration. The Project Energize air sealing efforts generated the greatest reductions in the leakiest homes.

Bill Reductions from CFL Installation

48. One of the primary reductions in energy bills accruing from the Project Energize energy efficiency interventions involved the installation of energy efficiency compact fluorescent (CFLs) in Cohort recipient homes. Project Energize staff installed CFLs at the time of the in-home energy assessment. While the number of CFLs installed was generally limited to six units per home, a few number of homes received more than this number.

49. Georgia REACH consumers saved, on average, between $50 and $67 each year depending on whether the CFLs installed through Project Reach replaced 75W or 100W incandescent light bulbs. Over a three year period, the Georgia REACH project generated between $150 and $200 in electric savings (assuming constant electric prices) for its Cohort participants.

50. The installation of CFLs, standing alone, reduced the energy bills of Georgia REACH Cohort participants by significant percentages. In the scenario involving replacement of 100W light bulbs, electricity savings generated dollar savings ranging from 2% to 6% of the household's electricity bill. In the scenario involving replacement of 75W light bulbs, electricity savings generated dollar savings ranging from 2% to 12% of the household's electricity bill.

Utility Bill Payment Impacts

51. One key attribute of the self-sustainability of home energy within Project Energize Cohort participants is achieving an ability to make utility bill payments in a full and timely fashion.

52. The most common indicator of whether complete payment have been received from a utility customer involves measuring both the incidence and extent of arrears. The incidence of arrears considers the proportion of the total population in arrears. The extent of arrears is measured by assessing the degree to which dollars of payments each month cover the dollars of current bills.

53. The provision of Georgia REACH services appears to substantively increase the completeness of bill payment within the Cohort population. The net improvement in the cohort group's current bill coverage index was 15% over the first four months after the treatment.

54. The provision of Georgia REACH services appears to substantively reduce the incidence of arrears in the low-income population. The net change in the percentage of Cohort accounts in arrears indicates a reduction of 12% in the percentage of Cohort accounts in arrears.

55. The promptness of bill payment considers not merely whether a customer pays his or her utility bill in full, but whether the customer pays his or her utility bill on time on a monthly basis. If a utility renders a bill for $100, that company wants a customer to pay the bill by the due date as well as paying the bill in full.

56. Cohort participants demonstrated a substantive net increase in the proportion of bills that resulted in a payment yielding a $0 balance in the next month. Georgia REACH cohort recipients experienced a net increase of 0.06 in the proportion of monthly payments yielding a $0 balance.

57. Georgia REACH cohort participants experienced an improvement in the proportion of payments that equal or exceed the current bill relative to what would have been experienced in the absence of the program. While the Georgia REACH program interventions did not result in an increase in the number of payments that equal or exceed the current bill, the program resulted in an improvement in current bill payments relative to what would have been experienced in the absence of the program. The program generated a net

improvement of 0.11 in the proportion of payments that equal or exceed the current bill each month.

58. An examination of the regularity of bill payment measures a different aspect of a customer's payment profile than does an examination of customer arrears. A customer may maintain a relatively low level of arrears by paying multiple months of bills on an infrequent basis. An examination of January arrears, for example, does not distinguish between the customer that has made his or her last twelve monthly payments on time and in full, the customer that has made $0 in payments during August through October (perhaps waiting for the annual LIHEAP benefit to pay off those arrears), and the customer who makes three payments over the year of amounts equal to the total annual bill. While the "bills behind" statistic has a regularity of payment implicit in it, the regularity of payments can be directly measured.

59. There was a substantive improvement in the payment-to-bill ratio for Georgia REACH Cohort participants subsequent to the receipt of a Project Energize home energy audit. The data supports a conclusion that there was a slight, but measurable, improvement in the payments-to-bills ratio for Georgia REACH cohort participants. Not only did the payment-to-bills ratio increase, but also the monthly volatility in payments-to-bills was reduced.

60. The Georgia REACH program interventions substantively improved the utility bill payment outcomes for the program's Cohort participants. Payment outcomes were considered for the full range of a payment profile for the REACH participants. The profile included the completeness of payment, the timeliness of payments, and the regularity of payments. While the improvement in the regularity of payments was subtler and less substantive than other payment metrics, across-the-board, Georgia REACH Cohort participants improved their utility bill payment patterns as a result of program interventions.

Energy Efficiency Knowledge from Workshop Training

61. In addition to generating measurable energy savings through a combination of the energy efficiency interventions discussed throughout (e.g., air sealing, appliance replacement, energy education), one of the goals of Project Energize was to raise the level of energy efficiency awareness and educational levels among the Project Energize Cohort population.

62. REACH participants had modest knowledge about energy use in their homes prior to attending the energy efficiency workshops. The seminar resulted in significantly improved scores. The seminar improved REACH participant knowledge to allow substantial improvements in the highest test scores. In addition, more than one-third of the incorrect responses found on the pre-test were eliminated by the Georgia REACH half-day training.

63. Workshop attendees showed particularly significant improvement on six of the fifteen questions designed to measure the effectiveness of the Georgia REACH energy efficiency training. The biggest improvement came in knowledge about taking showers rather than baths. The second greatest improvement came in the knowledge exhibited regarding warming a cold home. Workshop attendees correctly responded that a home does *not* heat more quickly if the thermostat is set higher (*e.g.*, 80 degrees rather than 70 degrees). The third greatest improvement came in knowledge about the benefits that households derive from lowering household utility bills. More REACH participants correctly answered on the post-test that lowering utility bills generated benefits beyond simply saving money.

64. The most commonly correctly answered question in both the pre- and post-test involved the recognition that one need not wash clothes in hot water in order to get them "really clean."

65. Some gaps in energy efficiency knowledge remained after receiving training. The most frequently *in*correctly answered question was about whether it was *false* that a toaster oven uses less energy than a microwave to cook two potatoes. Moreover, more than one-third of workshop attendees *in*correctly answered whether it was *true* that utility expenses, including the refrigerator, can be as high as the costs of heating for a typical household in the course of a year.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Project Energize was designed to improve the energy self-sufficiency of participating Cohort households. To accomplish this move toward self-sufficiency, Project Energize was designed to address some of the systemic barriers to energy self-sufficiency and to help families identify areas in which knowledge and behavioral changes would make a difference to long-term energy burden and payments. Project Energize provided an array of services to the 300 households that it intended to bring through the program.

THE EVALUATION QUESTIONS

At the inception of Project Energize, the Georgia REACH project staff established eight "evaluation questions" which they wished to be answered by the end of the project. Given the assessment of Project Energize presented above, the evaluation questions are answered as follows:

- **Did the program operate as designed and intended?** Yes. The program combined energy efficiency education with energy efficiency investments with intense one-on-one case management to provide compelling energy affordability services to REACH Cohort participants. Each program component "worked." Home energy audits were performed resulting in a combination of air sealing and appliance replacement where appropriate. Household financial counseling was delivered (coupled with a limited amount of cash assistance to pay pre-existing arrears). Energy education was provided, both on an individualized one-on-one setting and in group workshop settings. Intensive case management was provided, resulting not only in improved financial literacy, but also in referrals to appropriate additional community resources.

- **Are the interventions implemented for each individual household related to the specific risks facing that household?** Yes. A specific individualized risk assessment was performed for each Project Energize Cohort participant. Project Energize interventions were tailored not only to the specific energy needs of the households, but to the specific social and economic consequences manifesting themselves as a result of the unaffordability of home energy. Ongoing case management allowed project staff to assess not only the family needs at the entry of each Cohort participant into REACH, but throughout the Cohort participant's continuing involvement with REACH. The tailored risk responses arising from the individualized risk assessment and case management were one of the most heavily praised aspects of the Georgia REACH program.

- **Does the program result in reductions in energy consumption?** Yes. The combination of energy education, appliance replacement, and air sealing efforts resulted in measurable reductions of both natural gas and electricity consumption.

- **Does the program result in reduced energy bills (and thus improved energy burdens)?** Yes. In addition to the reduced energy bills attributable to the air sealing

efforts, appliance replacement, and energy education, one particular program component leading to a reduction in electricity bills (and thus improved energy burdens) involved the replacement of incandescent light bulbs with new energy efficiency compact fluorescent light bulbs. This program component, standing alone, resulted in significant bill reductions for program participants.

- **Is there an improvement in energy efficiency knowledge?** Yes. The energy education workshops delivered by the Southface Institute through Project Energize were particularly effective in improving energy efficiency knowledge. REACH participants entered the program with a modest knowledge of energy efficiency matters. The REACH workshops substantively improved the knowledge on important ways in which households can take action to improve the energy efficiency of their home, reduce home energy bills, and improve home energy affordability. While some knowledge gaps remained after the workshops, the measured gain in energy efficiency knowledge was impressive.

- **Is there an improvement in utility bill payment patterns?** Yes. Utility bill payments patterns were measured in terms of the completeness, timeliness and regularity of utility bill payments. Substantive improvement occurred within the Cohort population for all three parameters.

- **Is there an improvement in energy self-sufficiency?** Yes. Energy self-sufficiency was measured using the Home Energy Insecurity Scale first developed for the federal LIHEAP office in 2003. The Georgia REACH project resulted in a demonstrated improvement in the number of households found to be capable and a demonstrated reduction of those households that are vulnerable. Even for the REACH participants not moving up the Home Energy Insecurity Scale, Project Energize reduced the number of indicators that placed those households in lower insecurity thresholds.

- **Were clients satisfied with the services delivered?** Clients universally expressed not only satisfaction with, but enthusiasm for, the Georgia REACH program. The caring, professional, involved efforts of the staff were repeatedly noted as being the highlights of the project to Cohort participants. Each of these client comments provided in their respective exit interviews standing alone --and certainly the sum of the comments when considered in their totality-- support the conclusion that Project Energize accomplished one of the major objectives of the Georgia REACH program.

Early in its REACH application, the State of Georgia (and Partnership for Community Action, the administrating community action agency) said that what Project Energize was all about was to "systematically assess and identify the areas and levels of risk the family faces, assist the family in setting and working toward concrete goals, and combine supportive relationships with tangible help." It is impossible to conclude anything but that the program accomplished that objective.

RECOMMENDATIONS FOR IMPROVEMENT

The Georgia REACH program operated as intended, produced the services promised, and generated the outcomes it desired. The program's overall design and operation are to be commended. Should the program be replicated in other jurisdictions, three design enhancements might be appropriate and are recommended for future REACH programs:[48]

- *First*, while REACH customers appeared to be able to make full, timely and regular payments toward their current bills, program participants appeared to continue to struggle with pre-existing arrears. While REACH participants succeeded in preventing *increased* arrears, and generated modest results in arrearage reduction, they frequently were unable to fully retire the arrears that they brought into the program. Future REACH programs should consider involving regulators with the extensive social service interventions in an effort to incorporate a modest arrearage forgiveness program through which timely current payments will be "rewarded" with credits applied against pre-existing arrears that exceed affordable levels. Through this added initiative, REACH participants that have a demonstrated ability to stay current will be able to work with a clean slate in the future.

- *Second*, while REACH staff provided an impressive range of interventions directed toward bringing the full range of community resources to bear on resolving household financial problems, the Earned Income Tax Credit (EITC) did not appear in the range of public resources accessed through the REACH program. Telephone lifeline credits, Food Stamps, the National School Lunch/Breakfast program, subsidized child care, Peachcare for Kids (health care), and the Standard Utility Allowance (for food stamps) were all accessed to provide support for communications, food, housing, and child care. While the REACH program was, by design, directed toward customers already participating in the federal fuel assistance program (LIHEAP), the program would benefit from targeting outreach for the EITC toward its payment-troubled participants. With an average benefit of more than $2,000, the EITC would provide an important additional resource to help these low-income customers meet their total winter fuel payments.

- *Third*, while REACH generated impressive results in all aspects of the program it adopted, a future program might wish to consider elevating the importance of one response to a risk that was amongst the most commonly cited. The energy education resulted in increased energy efficiency knowledge. The energy efficiency interventions (air sealing, appliance replacement) generated reductions in both natural gas and electric bills. The case management (along with other interventions) generated improved utility bill payment outcomes and improved Home Energy Security. One corollary issue frequently identified in the REACH risk assessments, however, involved both the lack of a savings account and the inability to develop

[48] Other specific recommendations on individual program details are included throughout the narrative discussion above. These recommendations regarding program implementation details most often address the ease of implementation rather than the appropriateness of program design.

personal resources to allow a cushion to use in responding to financial exigencies (either increased expenses or decreases household income). One financial exigency identified as an "increased expense" involved unexpectedly high home energy bills. Future REACH programs may wish to target not only the short-term outcome of helping participants meet their ***immediate*** needs in paying home energy bills (while at the same time putting food on the table), but in building household assets as well. Particularly if a REACH program were to incorporate an EITC outreach component into a future initiative, bringing REACH participants into the mainstream of financial markets, helping participants build savings, and focusing on not only the resolution of immediate income problems, but also the building of long-term household assets, can and should be incorporated into a broader program outcome.