Fairbanks Nonprofit Retrofit Pilot Project

Interim Report: Documentation and Recommendations

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Prepared by:

Cold Climate Housing Research Center

Fairbanks Nonprofit Retrofit Pilot Project Interim Report

Project Partners:
Cold Climate Housing Research Center
Rasmuson Foundation
Denali Commission
Rural Community Assistance Corporation
The Foraker Group
Alaska Housing Finance Corporation
Alaska Mental Health Trust Authority
Arctic Alliance for People

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Interior Community Health Center
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North Star Council on Aging
St. Matthew's Episcopal Church
Tanana Chiefs Conference

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Executive summary

Energy costs are higher in Alaska than the rest of the nation because of the state's colder climate and the reliance in many areas on fuel oil for space heating and power generation. In the past decade, several programs have addressed these high energy costs in the residential, public, and commercial building stock by offering programs to help with energy efficiency retrofits. However, nonprofit and tribal organizations in general have not benefited from these programs. They also face additional hurdles when considering the energy retrofit process as many are funded through donations and grants and lack the upfront capital necessary to take on a retrofit. Furthermore, many organizations operate on a tight budget and lack the additional employee time and expertise to navigate an energy retrofit.

The Cold Climate Housing Research Center (CCHRC), Denali Commission, Rasmuson Foundation, and the Rural Community Assistance Corporation launched the Fairbanks Nonprofit Retrofit Pilot Project in 2014 to facilitate energy retrofits for nonprofits and tribal organizations. The project, which provided organizations with free energy audits, technical assistance throughout the energy retrofit process, and an opportunity for loan financing, was intended to help Fairbanks nonprofits and tribal organizations realize energy savings in their buildings through an energy retrofit. This report documents the first two years of that project, during which a pilot cohort of organizations received energy audits and embarked on the retrofit process.

The project had four main goals which were intended to help evaluate if the project could be expanded into a statewide program, and four intended outcomes that would serve as a metric for project success.

Project goals

1. What are the programming and management needs associated with a program that bundles efforts and contracts for nonprofits seeking energy retrofits, including audits, financing, construction, recommissioning, and monitoring?
2. What guidelines should be established to address barriers faced by nonprofits and tribal organizations in accessing energy efficiency financing through a low-interest loan?
3. Are energy audits indicative of energy savings for nonprofit facilities?
4. Can this pilot project be expanded into a self-sustaining statewide program?

Project outcomes

1. The project would strengthen Fairbanks nonprofits by reducing energy costs, and result in at least ten Fairbanks nonprofits receiving energy audits.
2. The retrofits would reduce energy costs for nonprofit participants by 33%.
3. The retrofits should result in sufficient energy cost savings to cover the majority of the repayment of the low-interest loan used to finance them.
4. There should be a quantifiable increase in mission delivery from nonprofits receiving retrofits. Nonprofits will identify how any energy savings have impacted their functionality.

The pilot cohort of organizations was recruited through an application process in early 2014. Energy auditors that met qualifications set by project staff performed energy audits on each of the buildings in

the project. CCHRC staff and auditors explained audit results to the organizations, which then faced decisions on how to finance the retrofits and navigate the construction process. CCHRC staff provided technical assistance where necessary. Nonprofits had the opportunity to utilize low-interest loan financing to pay for the energy retrofit.

A total of 12 organizations, with 15 buildings, participated in the pilot study. At the end of 2015, two of these organizations had completed the retrofit process, eight buildings were in the midst of retrofits, and five had plans to begin at a later date. One retrofit was financed utilizing a loan from the pilot project; other retrofits are financed by, or will be financed, by grants, self-financing, or a combination of those options. The pilot project will conclude at the end of 2016 with documentation of all retrofits and an evaluation of project goals and outcomes.

Lessons learned through this project's first two years have been documented so that future energy retrofit programs may benefit from the resulting recommendations. First, energy retrofit programs must be comprehensive, including upfront and frequent communication between parties, technical assistance, an organized method for evaluating energy use, incorporation of building owner goals, financing options, post-retrofit training, and analysis and documentation of the energy retrofit project. At the same time, programs must be flexible, offering options for different building types, building owners, and staff capabilities. Finally, retrofit programs should be "packaged" into a one-stop shop that is easily navigated by the participant.

Programs can facilitate loan financing by communicating to participants about retrofit financing requirements and opportunities, including the benefits of timely energy efficiency retrofits. Then, participants must be offered straightforward loan applications, favorable financing terms, a flexible timeline, and options to finance non-energy efficiency construction for building owner goals together with the retrofit. Loans must be attractive for participants to consider them in an environment where normally projects are funded through grants.

Extending this pilot project to a statewide program would add additional challenges, especially in rural locations. However, as the potential for energy savings in Alaska is great, it is worth examining how to address these challenges through the final year of this project in order to help organizations in Alaska realize energy savings and achieve healthier buildings.

Contents

Acronyms

AAP	Arctic Alliance for People
AEA	Alaska Energy Authority
AHFC	Alaska Housing Finance Corporation
AHU	Air Handling Unit
ACCA	Alaska Center for Children and Adults
ADMA	Alaska Dog Musher's Association
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
CBFC	Carol Brice Family Center
CCHRC	Cold Climate Housing Research Center
DHW	Domestic Hot Water
ECI	Energy Cost Intensity
ECM	Energy Conservation Measure
ED	Executive Director
EEM	Energy Efficiency Measure
ESCO	Energy Service Company
EUI	Energy Use Index
FNRP	Fairbanks Nonprofit Retrofit Project
FNSB	Fairbanks North Star Borough
FRA	Fairbanks Resource Agency
GFCHF	Greater Fairbanks Community Hospital Foundation
HRV	Heat Recovery Ventilator
HVAC	Heating, Ventilation, and Air Conditioning
IAQ	Indoor Air Quality
ICHC	Interior Community Health Center
ICNVL	Interior Center for Nonviolent Living

IGA	Investment-Grade Energy Audit
IRS	Internal Revenue Service
LED	Light-emitting Diode
MSBSC	Midnight Sun Boy Scout Council
NOI	Notice of Intent to Apply
NSCA	North Star Council on Aging
O&M	Operations and Maintenance
RCAC	Rural Community Assistance Corporation
RFI	Request for Information
RFP	Request for Proposal
RFQ	Request for Quotation
SIR	Savings to Investment Ratio
TCC	Tanana Chiefs Conference
VFD	Variable Frequency Drive
VFM	Variable Frequency Motor

Introduction

The Cold Climate Housing Research Center, Denali Commission, Rasmuson Foundation, and the Rural Community Assistance Corporation launched a pilot project in 2014 to help Alaskan nonprofits and tribal organizations save money by making their buildings more energy efficient. The project provided energy audits as well as the opportunity for low-interest loan financing for retrofits to nonprofit organizations and tribal building owners in the Fairbanks area. Project staff also provided guidance through the energy retrofit process. This included arranging energy audits, discussing financing options for retrofits, coordinating contractors to complete the retrofit, and establishing plans for maintenance and energy monitoring. The goal of the pilot project was to pave the way for a statewide self-sustaining program for nonprofit energy efficiency retrofits.

Project partners

The organizations assembled for this project are focused on energy efficiency and capacity building in Alaska. The Cold Climate Housing Research Center (CCHRC), located in Fairbanks, became the administrator for the project. CCHRC is a nonprofit organization with a mission to promote and advance the development of healthy, durable, and sustainable shelter for Alaskans and other circumpolar people. CCHRC staff brought experience in the audit and retrofit process to the project as well as project management capabilities and a deep knowledge of the Fairbanks area.

Funding for the project was provided by two Alaskan organizations, the Denali Commission and the Rasmuson Foundation. The Denali Commission is an independent federal agency working to provide economic development in rural communities; the Rasmuson Foundation is a private family foundation promoting a better quality of life for Alaskans. Both organizations brought a long-term vision for a self-sustaining energy efficiency program to provide overall direction to the pilot project. They also prioritized the goal of learning from the pilot project so that obstacles could be addressed head-on in future projects.

The Rural Community Assistance Corporation (RCAC), a nonprofit organization based in California, joined the project to facilitate and administer loans for the retrofits. RCAC has experience with loan facilitation in Alaska and the capacity to provide technical and financial resources in rural areas. The Foraker Group, which promotes a healthy, sustainable nonprofit sector in Alaska, contributed to the project planning. The Foraker Group's work with Alaskan nonprofits allows it to identify and address the challenges facing nonprofits, especially in regard to energy costs and financing. Finally, the Arctic Alliance for People (AAP), a group dedicated to educating decision-makers about changing trends in human services, shared the pilot project with the local nonprofit community. AAP advertised the project to their nonprofit members, some of whom would go on to participate in the pilot cohort, and provided ongoing feedback on the project procedure and results.

Context

The pilot project operated within a specific scope to keep the project to a manageable budget and timeframe, with the idea that the lessons learned could be applied to a larger program in the future.

This scope defined the energy retrofit process to be used in the project as well as the geographical boundaries for participating nonprofits and tribal organizations.

Energy retrofits

The technical assistance for the energy retrofit process began with collecting baseline energy usage. The project coordinator then provided help arranging for the energy audits, which were paid for by through project funds and performed by a preferred project auditor. Technical support also included assistance with understanding audit results, implementing the audit recommendations, facilitating design work, and connecting organizations with contractors. Finally, the project offered financing through a low-interest loan if needed. In 2016, the pilot's final year, the project will calculate energy savings through evaluating the energy use of the facilities post-retrofit.

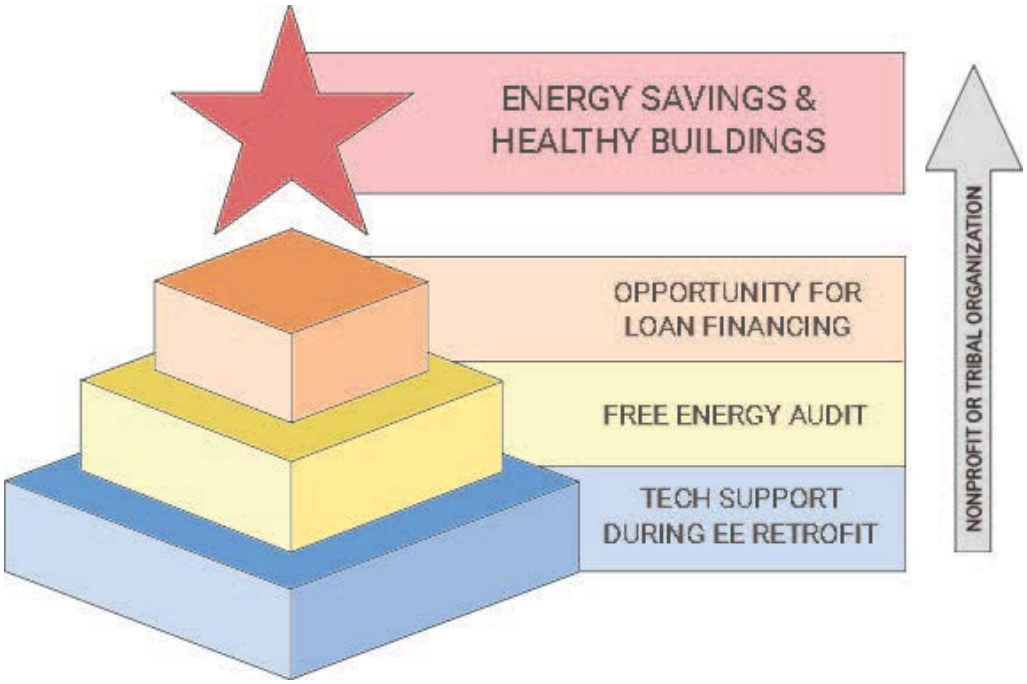

Figure 1: The pilot project was meant to provide support to organizations as they implemented energy efficiency retrofits.

Project location

The pilot focused on Fairbanks-area nonprofits and tribal organizations. Fairbanks was chosen in part because its high energy costs offer a large potential for energy savings through efficiency, and because the project administrator, CCHRC, is located in Fairbanks.

Energy efficiency retrofits in Alaska

Energy costs are higher in Alaska than national averages due to both the colder climate and reliance on expensive fuel oil for both space heating and power generation throughout much of the state. In 2013 it was estimated that individual Alaskans, companies, and industries spent approximately $5.7 billion annually on energy, which amounts to $8,027 per capita (Davies & Dodge, 2012). These high costs put a

burden on Alaskans throughout the state, whether in the public or private sector, in commercial and residential buildings.

The State of Alaska has been successful in reducing the burdens of high energy costs on Alaskans in several key sectors by implementing energy efficiency retrofit programs. While the initial capital costs of energy efficiency measures may be daunting, the energy savings pay back relatively quickly and continue to benefit building owners for many years. In the residential sector, the Home Energy Rebate and Weatherization Assistance programs run by the Alaska Housing Finance Corporation saved Alaskan renters and homeowners an estimated $70 million dollars from 2008 to 2012, a number that is still growing as building owners continue to reap more than $25 million a year in estimated annual energy cost savings (CCHRC, 2012).

The public sector has also benefitted from energy efficiency programs. AHFC conducted energy audits on public buildings throughout the state in 2011-2012, and auditors found an average of $21,800 in cost-effective savings possible for each building, with an estimated payback of approximately 4 years (Wiltse, Madden, & Valentine, 2014). Public buildings can finance energy improvements by applying to the Alaska Energy Efficiency Revolving Loan Program. Additionally, many other government and tribal buildings in rural Alaska benefited from the Alaska Energy Authority's Village Energy Efficiency Program that provided energy efficiency retrofits for public buildings. A sample of recent work conducted through this program achieved average village-wide energy savings of over $27,000 annually, with a simple payback of around five years (Alaska Building Science Network, 2012).

The nonprofit sector in general has not been able to benefit from these state-run energy efficiency programs. Nonprofit buildings reside in a gap: while often the buildings are residential-sized, they do not qualify for the Home Energy Rebate or Weatherization programs. And unlike many commercial buildings, they lack the revenue stream needed to pay for the up-front capital costs. Finally, as they are not considered public buildings, they are not eligible for financing through the Alaska Energy Efficiency Revolving Loan Program, although at the time of this report House Bill 58 is pending legislation in the 2016 Alaska Legislative Session. This bill would modify the Revolving Loan program to allow nonprofits and tribal entities access to the loan funds. The bill's current status can be found on the Alaska Legislature website.

Nonprofits provide essential community services that may not be addressed by the government or private sector. Since non-profit revenue generally comes primarily from grants and donations, they often lack the capital to invest in long-term energy efficiency improvements and thus are stuck with high maintenance and utility expenses as well as a high cost of providing services to the community. Over the life cycle of a building, these operational expenses far exceed the initial building cost, with one estimate for Central London, England office buildings, illustrated in Figure 1, showing that operating costs account for over 90% of the total costs for the building in its lifetime. For these buildings, the ratio of construction to maintenance and utilities to the cost of providing services was estimated at 1:1.5:15. The maintenance and utilities category includes the repair and maintenance of the building envelope, interior, and mechanical systems, all utilities including cleaning and security in addition to water and electricity, and maintenance of office equipment. The cost of providing services is largely the cost of

employee salaries, and has the potential to be reduced if a better building facilitates a higher retention of employees, fewer days lost to sickness, and higher productivity (Ive, 2006).

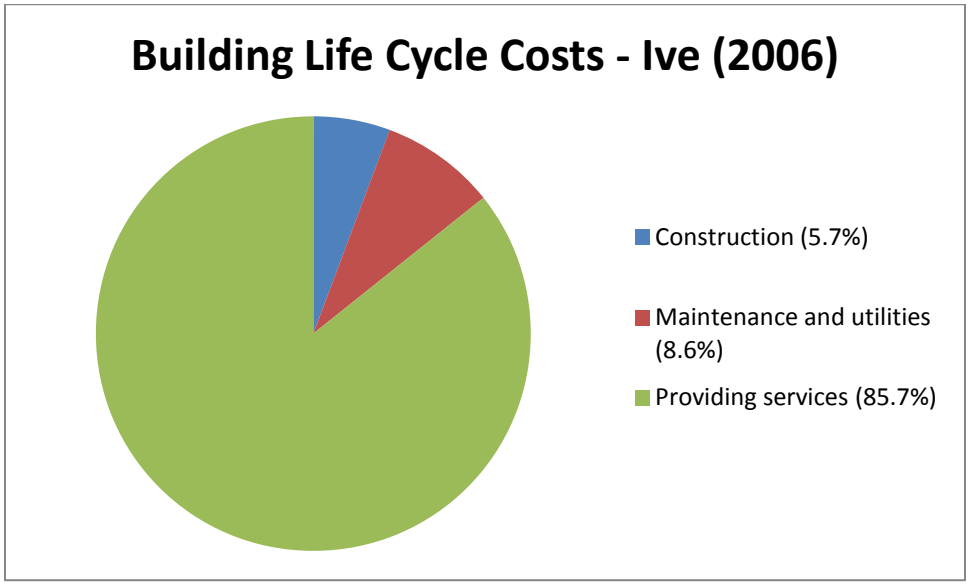

Figure 2: Ive (2006) provided commercial building life cycle costs broken into components.

In addition to securing the up-front capital, another hurdle for nonprofits is navigating the many processes and resources needed to reduce energy costs, such as energy auditing, financing, and construction. While a nonprofit may be eligible for a few existing energy programs, none of the programs offer comprehensive assistance through each step of the decision-making process. The goal of this pilot was to develop a clear path for nonprofits to reduce energy costs so they can focus their resources on meeting their missions. In addition, they would gain non-energy benefits of having an energy efficient building; including lessening their impact on the environment, having a more livable building and work environment, and improving indoor air quality. On a community scale, energy efficiency programs have economic benefits due to the jobs they create (United States EPA, 2011).

Project goals

The project partners intended for the pilot project to serve as a predecessor to a larger program that would improve the energy efficiency of nonprofit and tribal facilities across the state of Alaska. As such, the pilot project aimed to identify and address the barriers that would be encountered by a larger-scale program by addressing the following questions.

1. What are the programming and management needs associated with a program that bundles efforts and contracts for nonprofits seeking energy retrofits, including audits, financing, construction, recommissioning, and monitoring?
2. What guidelines should be established to address barriers faced by nonprofits and tribal organizations in accessing energy efficiency financing through a low-interest loan?
3. Are energy audits indicative of energy savings for nonprofit facilities?
4. Can this pilot project be extended to a self-sustaining statewide program?

Intended project outcomes

In addition to project goals, partners identified quantifiable outcomes for the pilot project. Ultimately, the project intended to show that energy audits and retrofits can lead to measurable results.

1. The project would strengthen Fairbanks nonprofits by reducing energy costs, and result in at least ten Fairbanks nonprofits receiving energy audits.
2. The retrofits would reduce energy costs for nonprofit participants by 33%.
3. The retrofits should result in sufficient energy cost savings to cover the majority of the repayment of the low-interest loan used to finance them.
4. There should be a quantifiable increase in mission delivery from nonprofits receiving retrofits. Nonprofits will identify how any energy savings have impacted their functionality.

Methodology

The project concept was defined in 2013, evolving through partner meetings during that year. The Fairbanks Nonprofit Retrofit Pilot Project (FNRP) officially launched in January 2014. The project procedure was outlined with flexibility incorporated into the process to accommodate unknowns such as how many organizations would be involved, how many auditors would be a part of the project, and how the audit results would influence the desire for organizations to pursue a loan. Here we document the actual project procedures as they unfolded from the start of 2014 through the fall of 2015. A report at the project conclusion in December 2016 will include a description of the procedures for the third year of the project.

Project timeline

FNRP began in January 2014 with a project team, funding, and a plan to perform energy audits for Fairbanks-area organizations. Support was provided through the retrofit process, and financing was made available for recommended energy improvements through a loan if needed. The application process occurred throughout the spring of 2014:

- February 2014: Project staff issued a Request for Proposals (RFP) to recruit organizations to participate in the project;
- March 21, 2014: Notices of Intent to Apply due;
- April 15, 2014: Full applications due;
- April 20, 2014: Notice of acceptance to the project sent out to pilot cohort. Those not accepted to the project had the chance to appeal the decision, but none pursued this option.

Preferred auditors for the project, recruited through a separate RFP, then completed audits for the organizations throughout the remainder of 2014 and early 2015. As the audits were completed, the auditors and the project coordinator shared the results with the organizations so they could decide what action to take based on the recommendations provided. Organizations were not required to act on the audit recommendations however, the project coordinator provided technical assistance to help ensure follow-up. The loan component of the project was intended to help with financial hurdles in implementing recommendations based on audit findings, but organizations were not required to pursue financing through this project. The financing, design, and construction phases of the project occurred during the remainder of 2015, with each organization on a self-determined timeline that depended on audit results, financing decisions, and other priorities for the organization boards.

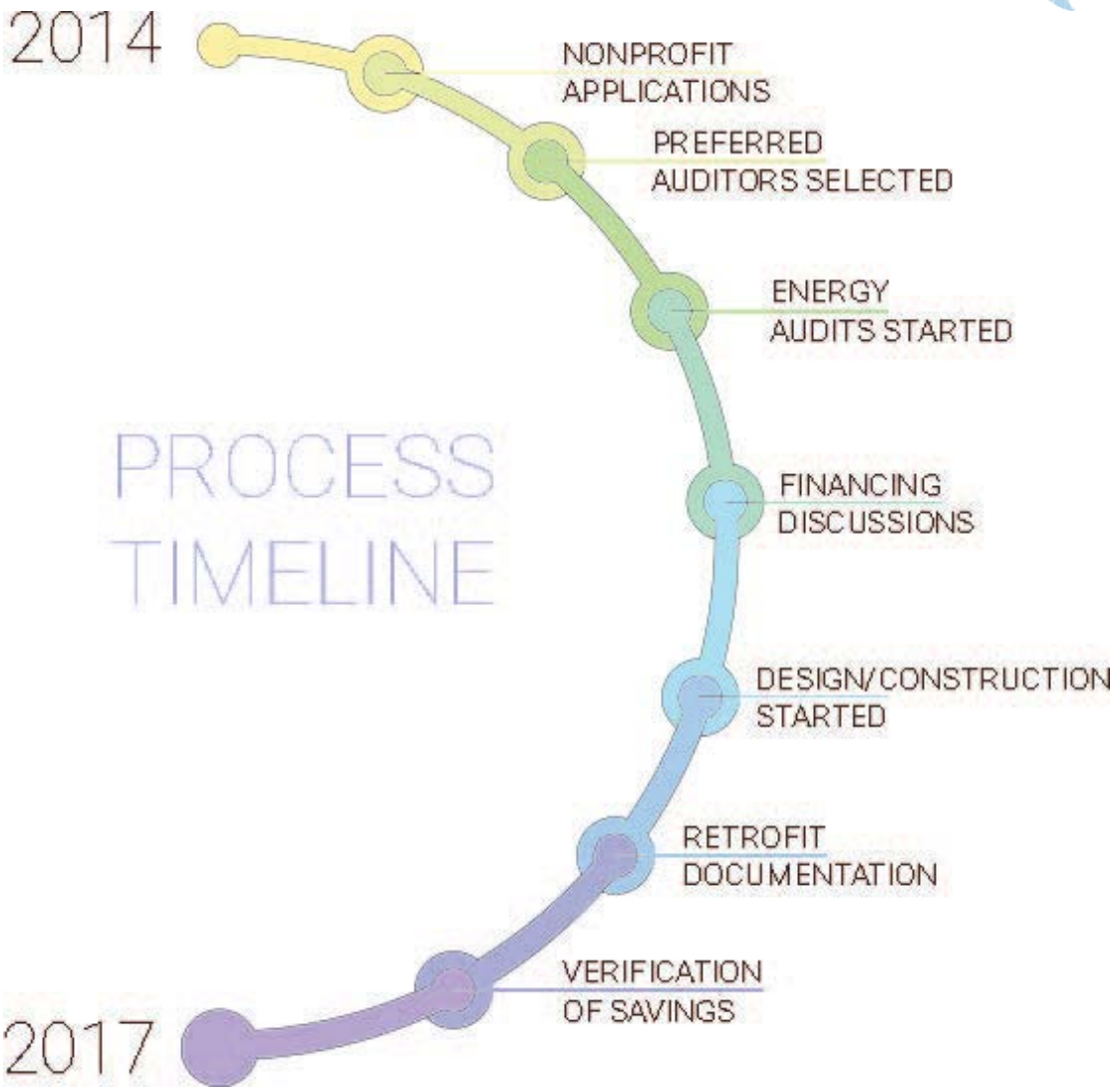

Figure 3: The pilot project began in 2014 and will conclude at the end of 2016.

The project will continue through 2016 and include energy monitoring of organizations that received retrofits; this analysis will compare the energy use of the buildings before and after the retrofits. The objectives of the monitoring will be to ascertain if the organization is saving energy, compare the amount of actual savings to the modeled savings, and evaluate project costs against final energy savings.

Recruitment

CCHRC, as the project administrator, advertised an RFP to Fairbanks-area organizations via the CCHRC website, word-of-mouth, local advertising, a United Way communications campaign, Foraker Group newsletter announcements, through the Arctic Alliance for the People, and using a Guide Star network email list generated from 990 tax forms. CCHRC also contacted Fairbanks-area organizations by phone to tell them about the project.

Eligible nonprofits had to be 501(c)(3) or (c)(4) organizations in good standing with the State of Alaska or holding Federal recognition of tribal status by the Bureau of Indian Affairs. They needed to own the

facility that was undergoing the retrofit. Finally, the Fairbanks North Star Borough needed to be the base of operations for participants.

The RFP detailed the energy efficiency retrofit package available to organizations, which included technical assistance, funding for energy audits, and the opportunity for low-interest retrofit financing. The technical assistance included arranging for the energy audit, evaluating the audit recommendations, applying for the loan, and arranging for retrofit design, contracting, and construction management. This assistance was provided free of charge to organizations participating in the project. Organizations were not obligated to utilize every part of the project, and were encouraged to apply if they felt they could benefit from any of the resources available through the project.

The RFP also described the application requirements. Organizations were required to submit the following to the CCHRC office in Fairbanks:

- a narrative of the organization describing its history, services, and impact;
- a statement on their need for the project, including an overview of any work to date;
- information on the facility to be used for benchmarking, such as the building type, square footage, and primary operating hours;
- a Board of Directors listing;
- annual operating budget;
- the most recent statement of financial position, activities, and cash flows;
- utility bills from the previous two years;
- the most recent certified financial audit or review;
- IRS 501(c)3 or 4 designation or Federal recognition of tribal status;
- an Alaska Business License; and
- a non-binding notice of intent to apply.

Selection process

Nonprofits and tribal organizations that informed the FNRP coordinator of their intent to apply were added to the project communications list. They received updates, reminders, and opportunities to ask questions about the application process. CCHRC staff helped eligible organizations complete the application.

Once applications were submitted, CCHRC staff visited each applicant building to review the facility conditions, check the facility's rough energy use, and meet the building staff. The information from the site visits was compiled with application information into an evaluation sheet. The evaluation sheet used is available in Appendix C, and information on the organizations in the pilot cohort from the evaluations and their audits is located in Appendix B. Each organization's evaluation sheet contained information about:

- its eligibility;
- an estimate of the building's energy profile, estimated from energy bills and building information provided by organizations in the application;

- financial ratios if the organization was able to provide a financial audit for the previous year;
- its mission; and
- building information from preliminary site visits from CCHRC.

A selection committee reviewed the evaluation sheets for each organization. The selection committee included representatives from CCHRC, the Rasmuson Foundation, Denali Commission, Foraker Group, Alaska Housing Finance Corporation, Arctic Alliance for the People, and a member of the Fairbanks community. The goal of the committee was to admit a minimum of 10 organizations; a maximum number was not set. Each person on the selection committee had the responsibility of reviewing the information in the evaluation sheets about each organization and, if there was sufficient information about the organization, making a decision on whether or not the organization should be selected for the project. The selection committee discussed each organization individually to decide which to admit to the pilot project.

Organizations not selected were allowed to make an appeal in writing within seven calendar days after notification of receipt of the original decision, though none exercised this option. They were also eligible to receive minimal technical assistance through the project regarding steps to reduce energy costs and potential ways to implement the recommendations.

Audits

Each organization required an energy audit to begin the retrofit process, because audits document the current state of the building and its energy use as well as suggesting the path forward for the retrofit. The project arranged and paid for the organization audits, except in cases where the organization had a very recent audit meeting the same standards as the audits provided by the project and could be utilized for retrofit planning.

Auditors applied to be on a preferred list of providers for the project to conduct audits for the pilot cohort to ensure all audits were conducted to the same standard. This required the following qualifications:

- Certified Energy Auditor or Certified Energy Manager as certified by the Association of Energy Engineers or another AHFC-approved equivalent certification body;
- Alaska Professional Engineer, or Board-approved Arctic Engineering Courses for the Alaska Professional Engineer stamp, or AHFC-approved Cold Climate Building Science course(s);
- experience on at least 25 investment-grade energy audits (IGAs) within the past 10 years; and
- experience with at least 10 residential or light commercial IGAs.

CCHRC recruited auditors for the preferred auditor list by sending a Request for Proposal through the Association of Alaskan Energy Raters.

Three applicants met the qualifications to participate as preferred auditors. All had experience doing commercial audits in Alaska with other financing programs. Project staff assigned the auditors to

different organizations based on initial bids provided by the auditors and the skill sets and experience of each auditor regarding particular building types and sizes.

Audits were arranged by CCHRC and the assigned auditor based on convenience for the participants. Auditors then sent the audit results to the FNRP coordinator at CCHRC. The audits were reviewed by the project coordinator, who then shared them with the executive directors and facility managers. They were also reviewed by a volunteer estimation firm and energy service contractor to check for any discrepancies in local construction costs. If the organizations had questions about their audit results, they were able to contact both the project coordinator and/or the auditor.

The auditors conducted the equivalent of ASHRAE Level II audits for this project. An ASHRAE Level II audit follows the general procedure outlined below, though each auditor uses a slightly different method:

1. The auditor talks with the building owner about the building and objectives for the audit and financing program.
2. The auditor gathers three to four years of utility bills to benchmark the energy use of the building.
3. The auditor visits the building. During this site visit, they go through the building and examine energy appliances and water and control systems. The auditor talks with maintenance and operations staff about procedures that occur in the building. Finally, they may conduct diagnostic tests, such as a blower door test or installing data loggers to track energy usage.
4. The auditor uses the benchmarking energy use and information from the site visit to create an energy model of the building. In Alaska, auditors use AkWarm, an energy-rating and design program maintained by the Alaska Housing Finance Corporation. They may also use their own spreadsheets or other preferred applications to supplement the AkWarm model.
5. After the model is created, the auditor uses it to evaluate which energy efficiency and conservation strategies will reduce energy use while meeting the client's objectives.
6. The information from the audit is combined with the recommendations into a report that is shared with the building owner. The report also includes information about the financial aspect of the recommendations – cost estimates for implementation and payback or net present value calculations for each item.
7. The auditor reviews the report and cost estimates with the building owner and is available to help arrange or manage the retrofit work. For instance, the auditor can sometimes recommend contractors or designers, or answer follow-up questions about the efficiency strategies in the report.
8. Once the audit is finalized, many auditors upload the information to the Alaska Retrofit Information System to serve as a baseline for later verification and energy monitoring services.

Nonprofit and tribal organization decisions on how to proceed

Each organization followed its own process to receive the audit recommendations and cost estimates, process the recommendations internally, and come to a decision about pursuing and financing a retrofit. There were no requirements from the project on having to pursue a retrofit or how to finance it.

However, the project offered technical support and the option for loan financing assistance to help ensure follow-up to audit recommendations.

The project point of contact for the organization was designated by the organization, and could be the executive director, a building or property manager, the executive director with a building manager, a portion of the board, or the entire board. This person or group received and reviewed the audit results. Then, some organizations preferred to rely on the auditor or the FNRP project coordinator to explain the audit results at a board meeting, while other project contacts presented the results themselves. For larger organizations, different departments, such as the maintenance employees or financing department, also received the audit results.

In choosing how to finance the retrofits, organizations considered the cost estimates of the recommendations, their ability to finance the retrofit without outside assistance, their funding structure, and the loan terms offered through the project. In many cases, the board made the decision as a group; in other cases the final decision was recommended by a subcommittee or department. For examples of the decision making process that happened in the retrofits in this project, see Appendix B: Pilot cohort summaries.

Design cost estimates

Some audits recommended retrofits that required engineering or other design work prior to actual construction. For example, an audit might suggest a new boiler which typically also entails adapting the associated plumbing in the mechanical room, adding insulation to a wall system which may require specific types and amounts of insulation, or installing a heat recovery ventilation (HRV) system and ductwork. In cases such as these, a contractor may require a design document to properly plan and implement the retrofit work. On the other hand, retrofits such as window replacements, light bulb replacements, or installing a programmable thermostat may not require design work. In these cases, contractors can simply replace or install the suggested appliance.

If design work is required, building managers have a few options for obtaining it. One option is to have a construction manager or engineering firm produce the design documents and a cost estimate for construction, and then the building manager will give these documents to a separate mechanical contractor to perform the work. In other cases, the mechanical contractor may have a designer on staff and is be capable of doing the design and construction under a single contract.

The audits did not provide estimates of the cost of the design work and the original project plan did not address how design work would be funded. This proved to be an issue for some organizations because the need to fund design came as a surprise, and because the final construction cost estimate depended on the design estimates. The scope of the project was amended in 2015 to address this issue and make design funds available to participants. However, unlike audit funding, design funds were subject to the following requirements:

- organization leadership had to commit to completing the retrofits identified in the audit;

- organizations had to commit to participating in the third year of the project (2016) so researchers could collect utility bills and assess the accuracy of the audit to predict energy savings; and
- the board had to acknowledge the loan financing availability offered through RCAC and agree to use loan funds to finance at least one third of the construction costs.

Loans

Organizations were provided with an opportunity to apply for a loan through FNRP. Loan financing was not required, but presented as an option for organizations in an effort to encourage follow-through with more extensive retrofits.

Loans for this pilot project were administered through the Rural Community Assistance Corporation (RCAC). RCAC is a nonprofit organization based in California that provides a variety of technical and financial resources to rural communities throughout the western United States, including Alaska. The loan fund department administers loans for environmental infrastructure, waste programs, and affordable housing. There is also a small business loan program and a community facility loan program – the latter one was used to facilitate and administer the loans in the Fairbanks pilot project (J. Weidemaier, RCAC loan officer; personal communication; October 12, 2015). The capital for the FNRP loans was sponsored by the Rasmuson Foundation, which allowed RCAC to set a fixed interest rate. The terms of the loan financing were a 4% interest rate, 1% loan fee, and a maximum 10-year loan term.

Organizations that wanted to use loan financing began by filling out an application online. This application is similar to a grant application and requires organizational documents, audit statements, and organization history. A loan officer processes the application, which typically takes around 30 days if the application was complete and there are no unforeseen circumstances. Upon acceptance of the loan financing, the borrower makes monthly payments to RCAC for the life of the loan; the borrower does not have any contact with the funder (J. Weidemaier, personal communication, October 12, 2015).

Construction management

The FNRP project coordinator helped organizations proceed to the construction phase of projects when necessary. In some cases, organizations had existing relationships with contractors and arranged construction work themselves. However, some participants did not have any industry contacts. Technical assistance included:

- obtaining cost estimates to refine the audit's estimation of construction costs (many of the estimations were done by a volunteer Alaskan firm, Estimations Inc., at no cost);
- obtaining construction bids;
- reviewing construction bids and final prices;
- helping negotiate not-to-exceed bids;
- reviewing scope of work;
- evaluating contractor credentials;

- arranging the opportunity to bundle construction bidding to lower overhead and project costs; and
- evaluating work post construction.

Post-retrofit outcomes

Project outcomes will be measured by the pilot project team in 2016 through an analysis of the energy use of buildings that followed through on recommendations from the audits. The results of this analysis will be discussed in a separate document.

Results

There are approximately 800 nonprofits in Fairbanks, based on 2014 IRS tax forms. The actual number of nonprofits operating and offering services in Fairbanks is unknown, some organizations operate in Fairbanks but are headquartered elsewhere, and some organizations headquartered here operate only in other locations (A. Cutting, Foraker Group, personal communication, October 12, 2015). The pilot project manager reached out to nonprofits and tribal organizations in Fairbanks that owned their own buildings and would be financially capable of securing a loan. This narrowed the amount of eligible nonprofits considerably – for context, between 100 and 150 nonprofits in Fairbanks have over $250,000 in assets as reported on IRS tax returns (A. Cutting, Foraker Group, personal communication, October 12, 2015).

Pilot cohort selection

After a period of advertisement about the project, a total of 35 organizations submitted a notice of intent to apply. Of these, a pilot cohort of 12 organizations eventually joined the project with 15 buildings. Tanana Chiefs Conference, St. Matthew's Episcopal Church, and the Interior Alaska Center for Non-violent Living each had two buildings accepted to the project. The application process is summarized in the following table.

Table 1: Organizations submitted notices of intent to apply, and applications, to be considered for the pilot project.

	Nonprofit	Notice of intent to apply submitted	Application submitted	Accepted to project
1	Alaska Center for Children and Adults	X	X	X
2	Alaska Dog Mushers Association	X	X	X
3	Breadline, Inc. – Stone Soup Café	X	X	X
4	Breast Cancer Detection Center of Alaska	X		
5	Calypso Farm and Ecology Center	X		
6	Carol Brice Family Center	X	X	X
7	Chena Ridge Friends Meeting	X	X	
8	Dance Theater Fairbanks	X	X	
9	Education Association Building Corporation	X		
10	Enep'ut Childrens' Center	X	X	
11	Ester Volunteer Fire Department	X		
12	Fairbanks Curling Club	X		
13	Fairbanks Community Museum	X	X	
14	Fairbanks Drama Association	X		
15	Fairbanks Montessori School	X		

	Nonprofit	Notice of intent to apply submitted	Application submitted	Accepted to project
16	Fairbanks Resource Agency – Airport Road	X	X	X
17	Fairbanks Resource Agency – Ruby Street	X	X	
18	Fairbanks Resource Agency – Tamarack Street	X	X	
19	Fairbanks Shakespeare Theater	X		
20	Fairbanks Youth Advocates	X		
21	Farthest North Girl Scout Council	X		
22	Folk School	X		
23	Goldstream Valley Lions Club	X	X	
24	Greater Fairbanks Community Hospital Foundation	X	X	X
25	Interior Alaska Center for Non-Violent Living – Main building	X	X	X
26	Interior Alaska Center for Non-violent Living – Suicide Prevention Hotline Building	X	X	X
27	Interior Community Health Center	X	X	X
28	Literacy Council of Alaska	X		
29	Midnight Sun Council, Boy Scouts of America	X	X	X
30	North Star Council on Aging	X	X	X
31	North Star Volunteer Fire Department	X		
32	Open Arms Child Development Center	X		
33	Presbyterian Hospitality House	X		
34	Salcha Fire and Rescue	X		
35	Santa's Senior Center	X		
36	Steese Area Volunteer Fire Department, Inc.	X		
37	St. Matthew's Episcopal Church - Church	X	X	X
38	St. Matthew's Episcopal Church – Rectory	X	X	X
39	Tanana Chiefs Conference – Al Ketzler building	X		X
40	Tanana Chiefs Conference – Chief Peter John building	X		X
	Totals	40	20	15

A number of organizations filled out a notice of intent to apply but were not able to complete an application. Reasons included that the organization discovered it did not meet the requirements of the project, such as owning the building that would participate; were not interested in loan financing; or were unable to complete the application in time with their current staff. Other organizations applied but were not accepted, mainly due to building-related reasons that were discovered through the application review and a site visit by CCHRC staff. For instance, some buildings were in such poor condition they needed replacement or major renovation rather than a retrofit, or a building's energy use was already low enough that retrofits would not have short payback times. In the case of the Fairbanks Resource Agency, the advisory committee decided to focus efforts on the largest office space rather than on all three buildings.

Of the organizations that applied but were not admitted to the pilot project, none appealed the decision. One organization, TCC, did not complete a project application but was later added to the project. They received energy audits through a separate project, AEA's commercial energy audit project, and joined FNRP to access the technical support and the option for loan financing.

Pilot cohort audit results

Preferred auditors performed audits for each building in the pilot cohort. FNRP funds paid for audits on 10 of the nonprofit buildings, and the remaining two nonprofits received audits through other programs – the North Star Council on Aging received an audit through the Alaska Mental Health Beneficiary's energy efficiency program, and TCC received two audits through AEA's commercial energy audit program.

In Table 2 on the following page, the starred organizations received both ASHRAE Level I and ASHAE Level II audits through the project. These audits were all performed by Nortech, one of the preferred auditors in the project. Nortech felt that Level I audits may be beneficial and in some cases reduce project costs if they do not result in a Level II audit. They asked and were granted the ability to begin with Level I audits for this project (P. Beardsley, Nortech, personal communication, October 21, 2015). In the pilot cohort, all Level I audits paid for by FNRP resulted in Level II recommendations and audits. The North Star Council on Aging received only a Level I audit, which was paid for through a separate program. For further information on the numbers reported in Table 2, please refer to Appendix E, which provides details on baseline energy use and cost as well as the calculations for the energy savings and retrofit cost.

Table 2: Each organization in the pilot cohort received an energy audit with recommended energy efficiency improvements. Starred organizations received both ASHRAE Level I and ASHRAE Level II audits. Please see Appendix E for notes on the numbers from the audits.

Organization	Building area (ft^2)	Total audit cost and *cost per square foot*	Baseline annual energy cost and *site EUI ($kBTU/ft^2/yr$)*	Retrofit cost estimate	Predicted annual energy savings and *percent of baseline annual cost*	Simple payback (years)
Alaska Center for Children and Adults	8,214	$3,695 *$0.45/ft²*	$30,770 *106*	$25,347	$8,732 *28%*	2.9
Alaska Dog Mushers Association	2,569	$3,325 *$1.29/ft²*	$9,955 *112*	$25,175	$3,687 *37%*	6.8
Breadline Inc. – Stone Soup Café *	3,965	$5,018 *$1.27/ft²*	$18,592 *132*	$3,120	$2,101 *11%*	1.5
Carol Brice Family Center*	25,147	$5,681 *$0.23/ft²*	$69,142 *88.7*	$34,884	$6,329 *9%*	5.5
Fairbanks Resource Agency*	19,040	$7,755 *$0.41/ft²*	$74,425 *106*	$67,066	$10,367 *14%*	6.5
Greater Fairbanks Community Hospital Foundation	1,480	$3,100 *$2.09/ft²*	$9,327 *164*	$24,995	$2,612 *28%*	9.6
Interior Alaska Center for Non-violent Living - Main building	50,750	$13,575 *$0.23/ft²*	$145,018 *87.1*	$272,511	$53,203 *37%*	5.1
Interior Alaska Center for Non-violent Living – Suicide Prevention Hotline Building	7,744	Included in above cost	$23,213 *84*	$33,743	$5,907 *25%*	5.7
Interior Community Health Center	19,590	$11,495 *$0.59/ft²*	$100,303 *138.6*	$35,088	$20,363 *20%*	1.7
Midnight Sun Council, Boy Scouts of America*	6,600	$5,596 *$0.85/ft²*	$22,582 *103*	$19,054	$5,093 *23%*	3.7

Organization	Building area (ft^2)	Total audit cost and *cost per square foot*	Baseline annual energy cost and *site EUI ($kBTU/ft^2/yr$)*	Retrofit cost estimate	Predicted annual energy savings and *percent of baseline annual cost*	Simple payback (years)
North Star Council on Aging	5,335	No cost to FNRP	$35,954 *171*	$26,090	$4,162 12%	6.3
St. Matthew's Episcopal Church - Church	11,787	$4,175 *$0.28/ft²*	$17,093 *80*	$90,943	$7,504 *44%*	12.1
St. Matthew's Episcopal Church – Rectory	2,932	Included in above cost	$14,241 *156*	$39,849	$10,775 *76%*	3.7
Tanana Chiefs Conference – Al Ketzler Building	30,000	No cost to FNRP	$129,695 *117*	$113,385	$26,276 20%	4.3
Tanana Chiefs Conference – Chief Peter John Building	70,000	No cost to FNRP	$327,154 *110*	$168,507	$61,737 *19%*	2.7

Each audit calculated the current energy costs and energy use index (EUI) for the buildings. The audits then provided recommendations for energy efficiency improvements, along with an estimate of the cost of implementing the retrofit and the potential annual energy savings. Note that these costs are tied to the dates of the audits, many of which occurred in 2014 and thus reflect that year's fuel prices and construction market.

Audit results on current energy costs and potential energy savings varied widely – a reflection of the several types of buildings represented in the pilot. The buildings ranged from 70,000-square-foot office buildings to small residential structures and varied in age from relatively new to several decades old. Buildings included residences, kitchens, and offices. For detailed information on the buildings and audit results, please refer to the case studies located in Appendix B, for more details on the methods auditors used to arrive at the figures in Table 2, please refer to Appendix E.

Post-audit construction and financing decisions

Each organization in the project has committed to acting on the audit recommendations, and the status of their retrofits fit into three categories:

1. Two organizations have completed all feasible retrofits and are finished with the construction process.
2. Five buildings have yet to begin retrofit construction, but have plans to begin in the near future. TCC has incorporated the retrofits for two buildings in its 2016 maintenance plan and budget. The North Star Council on Aging recently received grant funding for its retrofit and is currently looking for contractors. The Carol Brice Family Center is currently securing funding for a comprehensive design plan to incorporate the audit suggestions with its plan. Finally, the Greater Fairbanks Community Hospital Foundation has plans to retrofit its building, but is currently prioritizing other projects because the building evaluated for this project is vacant.
3. The remaining eight buildings are in various stages of the energy retrofit process. In many cases, the organizations have implemented the low-cost retrofit suggestions, and are at the financing or planning stage for the higher-cost recommendations. Please see Appendix B for details about each organization's progress.

Organizations used (or plan to use) four methods to finance retrofits: grants, loans, self-finance, and a combination of these options. For more details on financing decisions than provided below, please refer to the case studies in Appendix B.

At present time, one organization, FRA, has utilized the loan financing option through RCAC. Two other organizations, the Interior Alaska Center for Nonviolent Living and St. Matthew's Episcopal Church, are still considering using the loan as an option to pay for remaining retrofits; neither of these organizations plan to make a decision on loan financing in 2015.

One organization was able to fund its retrofit entirely through a grant. The North Star Council on Aging is concurrently participating in the Alaska Mental Health Trust Beneficiary energy efficiency program, which paid for the audit and will finance the retrofit in full. The Alaska Center for Children and Adults

utilized a renovation grant to fund a portion of its retrofits. Finally, the Carol Brice Family Center will search for grant funding after acquiring a comprehensive design plan.

Remaining organizations are implementing retrofits though some form of self-finance. Self-finance could include using building reserve funds, the building operating and maintenance budget, fundraising, and volunteer labor. Table 3 shows the funding mechanisms used by each organization in the pilot cohort.

Eight organizations will participate in the third year of the project. This final phase will involve detailed documentation of energy retrofits along with their financing, and assessing the accuracy of audits to predict construction costs and energy savings. Those not participating are not far enough in the retrofit process to document costs and energy savings or have undergone other changes that make it difficult to attribute changes in energy use to the energy retrofit process.

Table 3: Organizations used a variety of funding mechanisms to finance their energy retrofits.

Building	Level I audit	Level II audit	Retrofit	Financing mechanism	Participation in 2016
Alaska Center for Children and Adults		X	Complete	Renovation grant + self finance	No
Alaska Dog Mushers Association		X	Ongoing	Volunteer labor + self finance	Yes
Breadline Inc. – Stone Soup Café	X	X	Ongoing	Volunteer labor + self finance	No
Carol Brice Family Center	X	X	Yet to begin	Plan to self finance + grant	No
Fairbanks Resource Agency	X	X	Ongoing	RCAC loan	Yes
Greater Fairbanks Community Hospital Foundation		X	Yet to begin	Plan to self finance	No
Interior Alaska Center for Non-violent Living - Main building		X	Ongoing	Grant for current construction + plan for loan or self-finance for remaining	Yes
Interior Alaska Center for Non-violent Living – Suicide Prevention Hotline Building		X	Ongoing	See above	Yes
Interior Community Health Center		X	Complete	Self finance	Yes
Midnight Sun Council, Boy Scouts of America	X	X	Ongoing	Self finance	Yes
North Star Council on Aging	X		Yet to begin	Grant	Yes
St. Matthew's Episcopal Church - Church		X	Ongoing	Self finance + volunteer labor + plan for fundraising and/or loan	Yes
St. Matthew's Episcopal Church - Rectory		X	Ongoing	See above	Yes
Tanana Chiefs Conference – Al Ketzler Building		X	Yet to begin	Self finance	Yes
Tanana Chiefs Conference – Chief Peter John Building		X	Yet to begin	See above	Yes
Total (buildings): 15	5	14	Complete: 2 Ongoing: 8 Yet to begin: 5	Self finance and/or volunteer labor: 7 Loan: 1 Grant: 1 Combination: 6	11

Project outcomes

The FNRP stated four desired outcomes for organizations in the pilot cohort.

The project would strengthen Fairbanks nonprofits by reducing energy costs, and result in at least ten Fairbanks nonprofits receiving energy audits.

The project met the intended outcome of ten nonprofits receiving energy audits. Ten organizations with 12 buildings received audits directly through FNRP using project funds. An additional two organizations with three buildings received audits through other programs, but were able to utilize the technical assistance component of the project. These audits demonstrated the potential for strengthening nonprofits by reducing energy costs by quantifying the pre-retrofit energy performance of the buildings through the energy use index (EUI). The EUI is a number that expresses the building's energy use as a function of size. A higher EUI indicates that the building uses more energy per square foot, and thus is less energy efficient, than a building with a lower EUI.

The energy audits identified an average EUI for the buildings in the pilot of 117 kBTU/ft^2/year; and a median value of 110 kBTU/ft^2/year. The EUIs ranged from a low of 80 for St. Matthew's Episcopal Church to a high of 171 for the building occupied by the North Star Council on Aging.

Because of the variety of building types in the cohort, it is difficult to compare their average EUI to one value for the Fairbanks region, Table 4 provides some numbers for context.

Table 4: The average EUI for different groups of buildings in Alaska is shown below.

Building group	Average EUI (kBTU/ft^2/year)	Median EUI (kBTU/ft^2/year)	Maximum EUI (kBTU/ft^2/year)	Minimum EUI (kBTU/ft^2/year)
Pilot cohort	117	110	171	80
Fairbanks residences (Wiltse, Madden, Valentine, & Stevens, 2014)	143	-	-	-
Fairbanks residences built in 2005 or later (Wiltse, Madden, Valentine, & Stevens, 2014)	104	-	-	-
Fairbanks North Star Borough public buildings (Wiltse, Madden, & Valentine, 2014)	124.3	81.9	1,164.1	14.8
Alaska public buildings in climate zone 8 (Wiltse, Madden, & Valentine, 2014)	158.7	112.0	2,176.1	14.5

The pilot cohort had a higher average EUI than Fairbanks residences built in 2005 or later, but below average EUIs for all Fairbanks residences and Fairbanks North Star Borough public buildings. Additionally, the numbers were much lower than the average EUI for all public buildings in Alaska's climate zone 8, which includes buildings located outside of the Fairbanks North Star Borough. However, as discussed in the next section, the energy audits showed potential for a substantial decrease in energy use for organizations in the study.

The retrofits would reduce energy costs for nonprofits by 33%.

The audits calculated annual energy costs for each building at the time of the audit. Energy costs for the organizations spanned a wide range due to the variety in sizes, types, and uses of the buildings. There is clearly potential for savings as the average annual energy cost identified by the audits was $68,498, with costs ranging from $9,327 to $327,154. Even the minimum energy cost represents a large opportunity for reduction and reallocation of the costs to program funds.

The energy audits predicted annual energy savings if all recommended measures were implemented. The average annual savings was $15,257, with savings ranging from $2,101 to $61,737 (median value $7,504).

In terms of percent of annual costs, the average predicted savings was 27%; this prediction is dependent on all retrofit recommendations being implemented, and falls slightly short of the project's intended outcome. However, it does include the savings from retrofits that were both cost-effective and not cost-effective from a strictly financial perspective. The non-cost-effective retrofits were recommended for reasons other than energy savings, such as increased safety or decreased maintenance needs.

The retrofits should result in sufficient energy savings to cover the majority of the repayment of the low-interest loan used to finance them.

This outcome will be evaluated in 2016 after project staff can assess the energy savings realized by the organization that is using loan financing. The project will also estimate the payback period from the perspective of the funder: how long the realized energy savings take to pay back the audit and project costs.

There should be a quantifiable increase in mission delivery from nonprofits receiving retrofits. Nonprofits will identify how any energy savings have impacted their functionality.

This outcome will be assessed as best possible in 2016. Many organizations operate under grant restrictions that may not allow for energy savings to be directed directly into an account that would fund project activity. However, project staff will calculate energy savings and interview building owners to determine where and how funds from energy savings were utilized.

Recommendations

This section identifies lessons learned in the first two years of the project by revisiting the four project goals. It includes recommendations based on these lessons learned for any future retrofit program for nonprofit buildings.

What are the programming and management needs associated with a program that provides technical assistance, funding for energy audits, and low-interest financing to nonprofits seeking energy efficiency retrofits?

Through the lens of the past two years of this pilot project, there are three main programming and management needs for an energy program. For the highest rate of successful and long-lasting implementation of energy efficient retrofits, programs should be comprehensive, flexible, and "packaged." These three characteristics are explained in depth below, with additional detailed descriptions of program components and their justification appearing in Appendix A.

First, a program should be comprehensive. FRNP attempted to provide a comprehensive program by including three components of the retrofit process (free audit, technical assistance, and a financing option). However, gaps emerged over the course of the first two years of the project. Project staff, auditors, and nonprofit participants weighed in on the components that a comprehensive energy program should address:

- upfront communication about the project requirements, terms, and benefits;
- technical support from a project coordinator;
- measurement and verification;
- owner project requirements, capabilities, and timeline;
- financing options;
- audit;
- understanding the audit and communicating the results to stakeholders;
- design and construction estimate;
- financing and timeline decision;
- contractors;
- retrofit;
- operations & maintenance (O&M) training;
- occupant training; and
- post-retrofit analysis.

While a large number of program components may at first seem daunting, each one is intended to smooth the process of a retrofit program for the participants, encourage advancement to the next step, encourage completion of the program, and provide results to the organization and program staff. This type of cradle-to-grave, multiyear project has seen success in the past, and auditor Jim Fowler with Energy Audits of Alaska pointed out one example of this type of program is AEA's Village Energy Efficiency Program (personal communication, March 27, 2015). Robert Moss of Wisdom & Associates,

Inc., another FNRP auditor, also took this perspective by expressing his experience that smaller companies and nonprofits generally need help post-audit, especially if the audit is paid for by someone else, to overcome inertia and act on the recommendations (personal communication, March 24, 2015). The United States Environmental Protection Agency also recommends a comprehensive approach to energy efficiency projects, beginning with a performance assessment and including progress evaluation and recognition of achievements after the retrofit completion (United States EPA, 2011). In Alaska, Chris Kowalczewski of the Foraker Pre-Development Program has also found that the cradle-to-grave approach is mostly likely to result in meeting goals of the energy efficiency program and the nonprofit (C. Kowalczewski, personal communication, December 3, 2015).

Also, partnerships with other key organizations in the state would reduce the number of components that the program would have to provide from the start. For instance, the program coordinator can serve as a liaison to other resources in order to reduce what the program would have to provide. Thus a comprehensive program does not necessarily mean that every step has to be offered in full by the program. Some examples of potential partnerships for an Alaskan retrofit program include coordination with the Foraker Group, AHFC, and facilitating a list of preferred contractors who are familiar with the program and its requirements. The Foraker Group could assist with advertising and energy efficiency education (C. Kowalczewski, personal communication, September 15, 2015). At AHFC, there is potential to use the AHFC revolving loan fund if House Bill 58 is passed in the next legislative session. This legislation would open the revolving loan fund to tribes and nonprofit organizations (J. Kreiss-Tomkins, Sitka state legislator, personal communication, October 14, 2015). The bill's history, current sponsors, and status can be found on the Alaska State Legislature website. Also, AHFC will open an Energy Efficiency Technical Assistance Center in summer 2016. While the Center is aimed at assisting public facility owners with retrofits, it will be able to also provide other organizations and individuals with options for project development and financing resources (S. Waterman, AHFC, personal communication, March 31, 2016). For more information on the Technical Assistance Center, contact AHFC at eetac@ahfc.us or 877-257-3228.

Second, the retrofit program needs to be flexible. Nonprofit buildings are not uniform. They are used for different purposes, built in different decades, and span a range of sizes from small residential structures to multi-story office buildings. Nor are nonprofit management structures the same. While some nonprofits require board approval for construction and financing decisions, others have employees or even departments that can make those decisions independently. There is also variety in their financial structures, services, priorities, and experience with energy efficiency. Thus, any energy efficiency program has to be flexible enough to vary the structure and financing of the retrofit program in order to fit the organization's needs while still adhering to the general program guidelines.

Technical support

Some organizations will require extensive technical support, while others have navigated the audit process before and understand how to act on results. Organizations with the capability to take the lead in areas such as understanding the audit, communicating the results, and finding contractors should be

allowed to do so. The technical support will be coordinated by the program coordinator, who can tailor the amount of support to each organization's needs.

Building owner goals

Allow room to incorporate the organization's non-energy efficiency goals into audit, design, estimates, and construction: While some building owner goals will not necessarily involve energy efficiency, a comprehensive building design and construction plan will consider not only the building's energy efficiency needs, but also the needs of the organization to provide services to the community.

Timeline

Some organizations are able to complete the retrofit steps quickly, while others needed to prioritize other services or decisions, and these delays may not be apparent in the beginning of the project. Allowing for a flexible timeline will help organizations avoid having to drop out of the program for circumstances unforeseen when they applied. This considered, the project coordinator should perform regular check-ins to make sure the retrofits still go forward.

Audit Level

The auditor should make the decision as to whether or not the building requires an ASHRAE Level I or ASHRAE Level II audit after seeing the building and learning about the organization's building goals and financing considerations.

Financing

No one financing option should be mandatory. Instead, this discussion should begin before the audit occurs so organizations can start considering the financing options available to them. The auditor and project coordinator should be included in this process from the beginning, and the designer and contractor should also be informed about the organization's financing strategy.

Contractors

While program-preferred contractors will be extremely helpful for organizations not accustomed to construction retrofits, some organizations have existing relationships with contractors or will be capable of implementing building retrofits with maintenance staff. In these cases the organization should be given the flexibility to follow its typical procedure for construction.

Finally, an energy efficiency retrofit program must be "packaged" into a one-stop shop for everything retrofit-related. At the same time, the program must be streamlined enough that organizations can easily navigate the process. A "packaged" program is comprehensive as well as straightforward for project participants. Participants should be able to finish the program thinking the process was easy to complete, all questions were answered, and there was no interruption in their services to the community. Organization directors, board members, and staff are already busy with mission-related

tasks and in many cases do not have the time, expertise, or both to invest in an energy retrofit. The program must keep this in mind, and make the process easy to understand and complete.

While many components of a "packaged" program are described in detail in Appendix A, some additional considerations are discussed here. First, the program should retain the project coordinator position. This person should be able to navigate a organization through each step of the program and provide technical support, directing organizations to resources and communicating with them in their own language, rather than using the sometimes foreign vocabulary of the energy retrofit profession. This position gives organizations one central person to turn to for quick answers as the coordinator should serve as a liaison between organizations and auditors, designers, preferred contractors, and the resources offered by AHFC's Energy Efficiency Technical Assistance Center.

The project coordinator can create and maintain a program website containing information about energy retrofits and the program in one place. For instance, the website would include general information about energy efficiency and audits, including the benefits and common terms associated with each, explained through graphics and videos. It can also describe the program requirements in a flow chart, detailing expectations for participants, how long each part of the program can be expected to take, necessary forms and applications, links to technical resources, and financing options. Finally, the project coordinator can use the website to document case studies of organizations that have finished the program to serve as an example for organizations thinking of joining the program.

All forms required by the program, including the application and any forms required for financing options, should be simple to fill out and available on the program website. Nonprofits are typically accustomed to filling out grant applications, and this program's forms should be the equivalent or less time-consuming to fill out and submit.

The project should identify the human capacities of the organization to navigate different parts of the retrofit process, and tailor technical support to fill in the gaps.

There should be a list of preferred professionals, including auditors, estimators, designers, contractors, and consultants, for organizations who do not have established relationships with people in these fields.

The package should include resources for O&M training and post-retrofit analysis to encourage follow-through after construction and communicate results to program participants and program staff.

Other studies have made similar recommendations for energy efficiency programs to include a complete package (Kriegh, Fleischer, & Brahman, 2012) (Hayes, Nadel, Granda, & Hottel, 2011) (Bell, Hewitt, & Ferrante, 2014). Such a package should include the time and expertise to simultaneously orchestrate energy auditing, financing, and selection of construction contractors.

The program should be marketed with the idea that energy efficiency is a service that the program can provide which not only reduces costs but also results in non-energy benefits such as occupant comfort and reduced maintenance. This shift in mindset should be structured to help building managers visualize

that the costs are spread over time and minimize the choices building managers face about which upgrades should be purchased (Ferrante, 2016).

What guidelines should be established to address barriers faced by nonprofits and tribal organizations in accessing energy efficiency financing through a low-interest loan?

In this program, one loan has been issued to the pilot cohort, with two additional organizations still considering loan financing as an option. The financing decisions of the 12 participants were as follows:

- 1 loan;
- 1 project entirely grant-funded;
- 7 projects funded through volunteer labor and self-finance; and
- 6 projects used a combination of different funding mechanisms (two of these may utilize a loan).

There were five reasons identified by the pilot cohort as to why the loan financing option was not utilized. (Please refer to Appendix B for more details on financing decisions, and Appendix D for financing decisions made by the Fairbanks local government in a related project.) These are listed below, and are accompanied by suggestions on how to facilitate loan financing in the future. As grant funding decreases, loan financing should be made available to take its place so that energy efficiency retrofit work can continue to be completed.

1. **Upon learning the results of the audit, the organization determined that there was a way to self-finance the retrofit and felt that self-financing was a preferable option to paying interest on a loan.** Methods of self-financing included incorporating the retrofit into the operating budget (TCC, Midnight Sun Council Boy Scouts, Greater Fairbanks Community Hospital Foundation), paying for the retrofit using building reserve funds (Stone Soup Café, Interior Community Health Center, Alaska Center for Children and Adults), using fundraising (Greater Fairbanks Community Hospital Foundation, St. Matthew's Episcopal Church, Carol Brice Family Center), volunteer labor (Alaska Dog Mushers Association, St. Matthew's Episcopal Church) and by selling a lease (Alaska Dog Mushers Association).

   This is not a barrier to loan financing. If the organization is capable and willing to contribute its own time and money to the energy retrofit, the program should be flexible in retrofit funding requirements and allow it to do so.

2. **The organization is reluctant to take on debt.** Six of the twelve organizations in the pilot cohort expressed that they would be reluctant to take out a loan under any circumstances and if loan financing was a requirement of a retrofit program, they would reconsider participating. Five of these organizations stated they avoid debt whenever possible and one has a policy of not taking on debt. The Midnight Sun Council Boy Scouts does not take on debt as a policy because it is difficult to work debt repayment into an annual budget and they are afraid of a situation where they cannot pay the debt back (G. Lewis, personal communication, August 13, 2015). Of those opposed to taking on debt, one cited past financial troubles and the desire not to obligate a

future board to debt repayment (P. Ciniero, personal communication, September 8, 2015); another cited that it is difficult to take out a loan as a church because banks do not like the possibility of foreclosing on a church (N. Gaines, personal communication, August 21, 2015); the others did not cite specific reasons. This reluctance to take on debt was also noted in a separate study of nonprofit retrofits in Cincinnati (ACEEE & University of Cincinnati Economics Center, 2011).

Retrofit programs can address this barrier in two ways. First, **there must be upfront communication about program financing requirements and opportunities**. Organizations should be aware of each option (or lack thereof) at the beginning of the program, whether those options include a loan financing requirement, grants or grant assistance, self-financing, and more. This information should be available in multiple forms: in the application, in program advertising, and in personal communication. Also, there should be a discussion about financing prior to the audit. This helps organizations think about how audit results will affect their decision to finance *and* helps the auditor tailor recommendations to any non-negotiable financing decisions. For instance, if the auditor is aware that a organization cannot take on debt, but has a certain amount of reserve funds, the recommendations can prioritize retrofits that are feasible to complete with the building reserve funds and include the preferred order of implementing the retrofits. Similarly, if an auditor is aware that the maintenance department will be implementing retrofits with the operating budget, the auditor can include the necessary schedule of retrofits as well as required training. Also, this information helps the auditor decide if a Level II audit is required, or if only a Level I audit is necessary for the level of funding available.

Second, **there should be ample education on the benefits of energy efficiency**. Organizations will be able to make more informed decisions about taking on debt when they understand the lifecycle costs of buildings, the payback period of retrofits, the non-economic benefits of energy efficiency, the annual potential savings, and the cost of waiting to implement retrofits. Education should be available through the program coordinator to not only the organization program contact, but also the staff, members, and board. It should be in multiple formats (videos, handouts, template presentations) so that organizations can use the tools as they see fit.

3. **There are grant funding restrictions that prevent them from using the grant to pay off debt.** This barrier was identified by the Interior Alaska Center for Non-Violent Living. Currently, organization managers use a grant to pay for their utilities, and this grant has a restriction to use to pay off a loan. Even though they would see a decrease in utility bills, loan payments would need to come out of their unrestricted cash. As for the energy savings, it depends on the grant as to whether those funds would return to the grantor or be eligible for diversion to programs (B. Sanfill, personal communication, October 16, 2015).

   Similar to (2) above, **upfront communication about financing requirements is essential**. This barrier is difficult to overcome from the perspective of the retrofit program; however, retrofit

programs can still work for nonprofits with these restrictions by discussing other financing possibilities in a conversation between the organization, auditor, and program coordinator prior to the audit.

4. **There is a long approval process for acquiring debt.** St. Matthew's Episcopal Church identified this barrier by explaining that a loan would require approval from not only its vestry but also by the diocese. This increases the amount of time that is required to obtain the financing.

   There should be a flexible timeline for completing the retrofit program. The program coordinator should continually check in with organizations experiencing delays. Upfront communication about financing options will also make all parties aware of where delays can occur and how the auditor and program coordinator can help the organization navigate them.

5. **The loan terms and application process offered through the program were not favorable.** Two organizations, including the Fairbanks Resource Agency, felt that a loan would be easier to acquire if they used a bank in Fairbanks as the facilitator. FRA did utilize the financing available from RCAC but only because the program had paid for its audit. FRA would have preferred to use one of its typical lenders to avoid the extra paperwork and time (T. Schneider, personal communication, October 12, 2015). The Carol Brice Family Center reported that it may be able to negotiate better loan terms elsewhere, and would prefer to have options rather than to be obligated to take a loan from RCAC (B. Roth, personal communication, October 21, 2015).

   The loan financing option must include a straightforward application, favorable terms that are communicated clearly, and an option to finance non-energy efficiency construction for the owner's building goals together with the retrofit. In the pilot project, the application was online through RCAC's website and a loan officer was assigned to help organizations navigate the process. Terms for the loan included a 4% interest rate, a 1% loan fee, and a 10-year maximum loan term.

   If the program were to continue, continual feedback should be gathered from organizations on the loan terms and application process. Attractive loan financing is a necessary component of energy efficiency financing programs (Hayes, Nadel, Granda, & Hottel, 2011). Addressing the two barriers of interest rate and paperwork is key for a financing program to be accepted (J. Davies, personal communication, September 21, 2015). Also, the process will be streamlined as more loans are processed and the lending institution becomes more familiar with common hurdles and questions. Streamlined loans are necessary because "customers will often take a path of least resistance" and for that to be a loan the loan procedures must be consistent, straightforward, and well defined (Bell, Hewitt, & Ferrante, 2014). Having a party to guarantee the loan funds, as the Rasmuson Foundation did in this project, helps to eliminate some barriers in loan requirements (J. Weidemaier, personal communication, October 12, 2015).

   Finally, loan financing should be available for all construction occurring concurrently. For instance, if a organization is renovating its kitchen space to accommodate additional programs

and would also like to install more efficient ventilation and appliances, the loan should finance all construction. Otherwise, contractors will have to bill separately for different components of construction and the organization will have to search for additional funding sources, or a non-financing funding source that would cover the construction in its entirety.

Are energy audits indicative of energy savings for nonprofit facilities?

This goal will be assessed in the 2016, as project staff will evaluate realized energy savings and compare them to audit predictions. This assessment will rely on comparing energy bills for pre- and post- retrofit periods as well as interviews with staff and building occupants to establish retrofit timelines and building conditions.

It should be noted that fluctuating fuel prices (especially the decrease in oil prices) during the period of the pilot project will have an effect on the payback periods that the audits predicted. Thus, project staff will address both actual and theoretical fuel savings, based on current fuel prices as well as the fuel price at the time of the audit.

Can this pilot project be expanded to a self-sustaining statewide program?

Extending this pilot project to rural locations would add a number of additional challenges.

- accurate energy costs are more difficult to obtain;
- energy audit costs increase due to travel needs for building walkthrough;
- communicating audit results and answering follow-up questions will likely not occur in person;
- acting on audit recommendations by proceeding to design and construction may require skilled contractors willing to travel and work in rural locations, which will come at an increased cost;
- training for operation and maintenance staff to implement and maintain retrofits takes on an increased importance as repairs may not be easily fixed by outside parties;
- monitoring energy use and building conditions before and after the audit will have to be done remotely; and
- the likelihood of loan financing for rural buildings is unknown.

The potential for energy savings in rural Alaska is great. This pilot project operated in Fairbanks because the combination of the cold climate and high energy costs meant that the potential for energy savings was large. In many areas of rural Alaska, these conditions are accentuated even further, meaning that an energy efficiency retrofit can result in substantially better building conditions as well as energy savings.

The second part of this question – how the program can be financed to be self-sustaining – is even more challenging than the first. Offering loan financing with interest being redirected into the program is one possibility. Hayes, et. al. (2011) documented findings from a survey of energy efficiency financing programs in the United States. The programs in their survey were funded by both public, private, and a combination of sources. They found that the cumulative default rates for the programs were very low, ranging from 0-3%. However, program success depended on a number of factors and they also included several recommendations for loan programs – that they have a simple process, attractive loan terms,

address a target audience, consider on-bill financing mechanisms, and invest in marketing. (Hayes, Nadel, Granda, & Hottel, 2011). Likewise, a self-sustaining program in Alaska would need to be designed with a more streamlined and flexible process and will require start-up funding and mechanisms to direct loan interest back into the program. Some potential strategies for a program to sustain itself include those used by public-purpose ESCO models: bundling projects into portfolios, using multiple investors for portfolios, and using energy performance contracts for projects (Chant, 2014). Other strategies may be to include assistance applying for federal tax incentives for some of the retrofits into the program if the organization pays taxes (United States EPA, 2011), to use the carbon offset market to fund some of the retrofits through companies financing projects in order to sell the carbon credits, or to employ an on-bill financing or PACE model in partnership with a local utility or government in order to pay off the loan over time.

A self-sustaining program will also require a sufficient number of organizations choosing loan financing for retrofits to provide interest capital back into the program. Currently it is unknown how many organizations would choose loan financing and if that number would be sufficient for the program to sustain itself.

Currently, there is not enough information from this pilot program to assess this project goal. However, energy savings data in 2016 will help clarify the potential of energy savings for loan financing. Also, financial tracking of program funds and retrofit costs will allow for more detailed look at this question.

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Appendix A: Recommended program components

A comprehensive energy efficiency program begins with upfront communication and walks participants through a retrofit until the process is complete and documented.

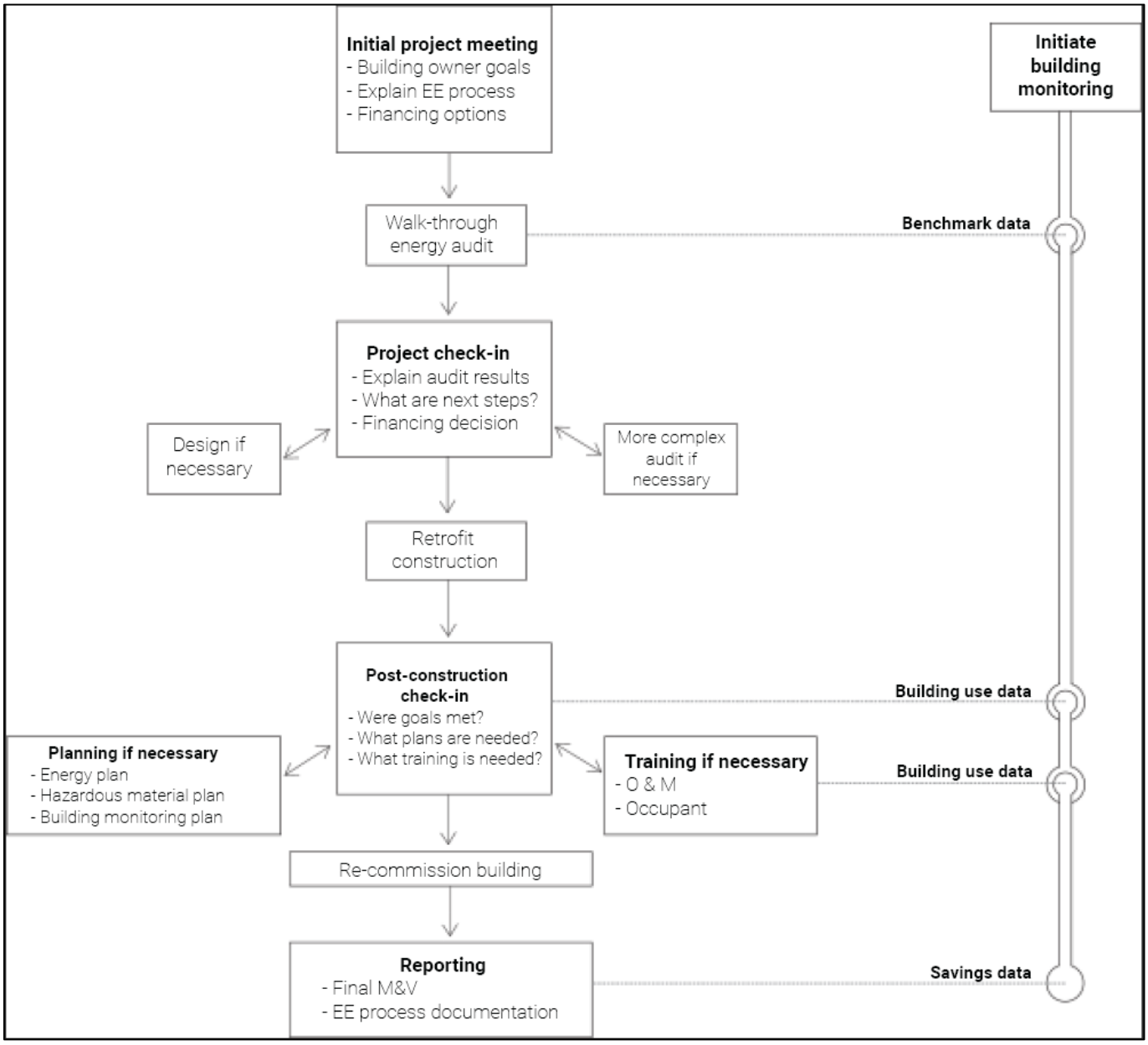

Figure 4: An EE project timeline begins with a meeting between the building owner and project coordinator, and ends by documenting the retrofit.

Upfront communication about the program requirements, terms, and benefits

An energy efficiency program should begin with a concise description about both the project provisions and the participant requirements. This information should be readily available to applicants in more

than one format (for instance, video, website, and print) and appear in all project documents– in the application, notice of intent to apply, advertisements, and in spoken communication on the project.

The different formats for the communication on the program will appeal to different audiences. Short advertisements, such as a one-page flyer or five-minute video can communicate the high level program goals to board members. More detailed information can be available through a guidebook and website for the nonprofit program contact and preferred contractors.

The information should also feature case studies of organizations that have completed the program with details on their experience, from application to audit results to financing decision to project completion and energy savings. These case studies will personalize the program, gives new applicants a sense of what is involved in the program, and helps to set expectations. Also, because the organization community in Alaska is small, it also gives organizations new to the program a potential peer to ask about their experience.

FNRP was a pilot project and thus lacked a concrete procedure and requirements on some aspects of the project. Several organizations and auditors commented on the lack of clarity in the beginning of the project, especially on the issue as to whether or not loan financing was required to participate. They suggested that in future projects this type of information be stated more broadly and clearly. While the application for FNRP included information about project requirements, we recommend providing this information in more locations and in different formats in future projects. The goal of this front-end communication should be to set the expectations for participation requirements **and** for what the program will provide from the beginning.

Technical support

FNRP included technical support, arranged by the project coordinator, a part-time position based at CCHRC. Organizations utilized this support for everything from help with the application to arranging the energy audit to understanding results to acquiring contractor estimates and analyzing financing options. The technical support piece was not necessary for every organization. For example, the Greater Fairbanks Community Hospital Foundation and TCC already had experience navigating the energy efficiency retrofit process; but other organizations, such as the North Star Council on Aging and TCC, felt the support was crucial to streamlining the process and to motivating them to pursue the next step in the retrofit.

The Alaska Housing Finance Corporation is currently setting up an Energy Efficiency Technical Assistance Center, funded by a DOE grant. This Center is aimed at helping public facilities with retrofits, but will offer options for project and financial support to other individuals and organizations. However, a project coordinator is still recommended for future programs in order to help organizations navigate the application and financing components specific to the program, as well as provide coordination with Technical Assistance Center. This personalizes the retrofit process by giving organizations one number to call and one contact to work with that the organization can access for quick answers to questions about

the retrofit process and the program. Depending on the number of organizations participating in the program, the project coordinator can consist of a part-time position at a third party organization.

Measurement and Verification

Building monitoring should commence prior to the audit and be uniform for each program participant. Such approaches, including that baseline consumption include a minimum of 2 years of consumption data, have been recommended by energy auditors in other retrofit programs (Armstrong, 2013). Furthermore, other research has noted that standard validation metrics that demonstrate energy savings help potential energy efficiency clients to have confidence that projected energy savings will be realized (Bell, Hewitt, & Ferrante, 2014). Finally, building monitoring of energy use and distribution of the results to all building staff can reduce the disconnect that can exist between occupants, auditors, maintenance staff, and administration. Such a disconnect has been found in public buildings, where maintenance staff may not know energy use is high because they do not pay the bills, and the finance department may pay energy bills with no knowledge that there is a potential to reduce them (Armstrong, R., 2012).

At a minimum, energy monitoring should entail *both* the collection of energy bills and the documentation of building conditions such as use, occupancy, indoor air quality, daylighting, and occupant comfort. The latter part can be established using surveys of building occupants and building walk-throughs, or could be documented through monitoring equipment that logs building data onto a user-friendly website.

The project should include a set procedure for building monitoring and sharing of data between the organization, program coordinator, and auditor that will be used for each building in the program, and monitoring should continue throughout retrofit process. This will allow project staff and the auditor to easily assess changes in energy use and building conditions due to the retrofit. One option would be to utilize the existing software of the EPA Portfolio Manager, which is used extensively in the lower 48 (J. Fowler, Energy Audits of Alaska, personal communication, December 1, 2015).

Furthermore, this monitoring can be incorporated into the O&M training and plan if conducted in partnership with the maintenance team of the building. Monitoring should continue through the same length of time as the financing term, as is customary for many ESCO and other financing programs require.

Owner project requirements, capabilities, and timeline

The energy efficiency project should incorporate a guided discussion about the organization's ideas for the building, as well as their abilities to implement those goals. For instance, some organizations may be looking for a deep retrofit, while others feel that they just have resources for a few quick fixes that will save them money. This discussion should occur between the organization, the auditor, and the project coordinator and should begin with a standardized set of questions on the organization's goals, financing and human capabilities, and timeline to facilitate the discussion. In most cases, energy audits complement organization and building goals. However, there is the possibility that the audit timeline

may conflict with the organization's goals for the building. There could also be hidden opportunities to perform retrofits in conjunction with other work. Some examples include:

- The Greater Fairbanks Community Hospital Foundation building is currently vacant. While they plan to retrofit it eventually, information on the eventual building plan helped the auditor calculate energy use when it would be occupied.
- The Carol Brice Family Center wanted to work on a comprehensive building retrofit and wanted a design plan and timeline that would balance its finances, the building science - which retrofits made sense to implement first to save energy, and building use - kitchen retrofits needed to be prioritized even though they may not result in the largest savings (B. Roth, Carol Brice Family Center, personal communication, October 21, 2015).
- Nortech already incorporates this concept into its audits by including an owner's project requirements document in the scope of work, which covers the facility needs and objectives without regard to energy efficiency (P. Beardsley, Nortech, personal communication, September 26, 2014).

In all cases, the more information about the organization's goals and capabilities that the auditor has, the more tailored the audit can be to their particular situation, and the more likely the recommendations are to be carried out. Furthermore, this information can help the program coordinator to tailor the level of technical support to the organization's needs (J. Fowler, Energy Audits of Alaska, personal communication, December 1, 2015). A similar approach was recommended for audits for public buildings in Alaska (Armstrong, R., 2012).

Financing options

In addition to a discussion on the organization's building and timeline goals, a discussion about financing should occur upfront. First, organizations should be aware of any financing options that the program pays for, so that they can consider that when analyzing the scope of their retrofit project. Second, they should be aware of the cost of waiting on retrofits, which can be shown using example building data, case studies, or visualization tools such as the one used by the energy efficiency financing firm SparkFund.

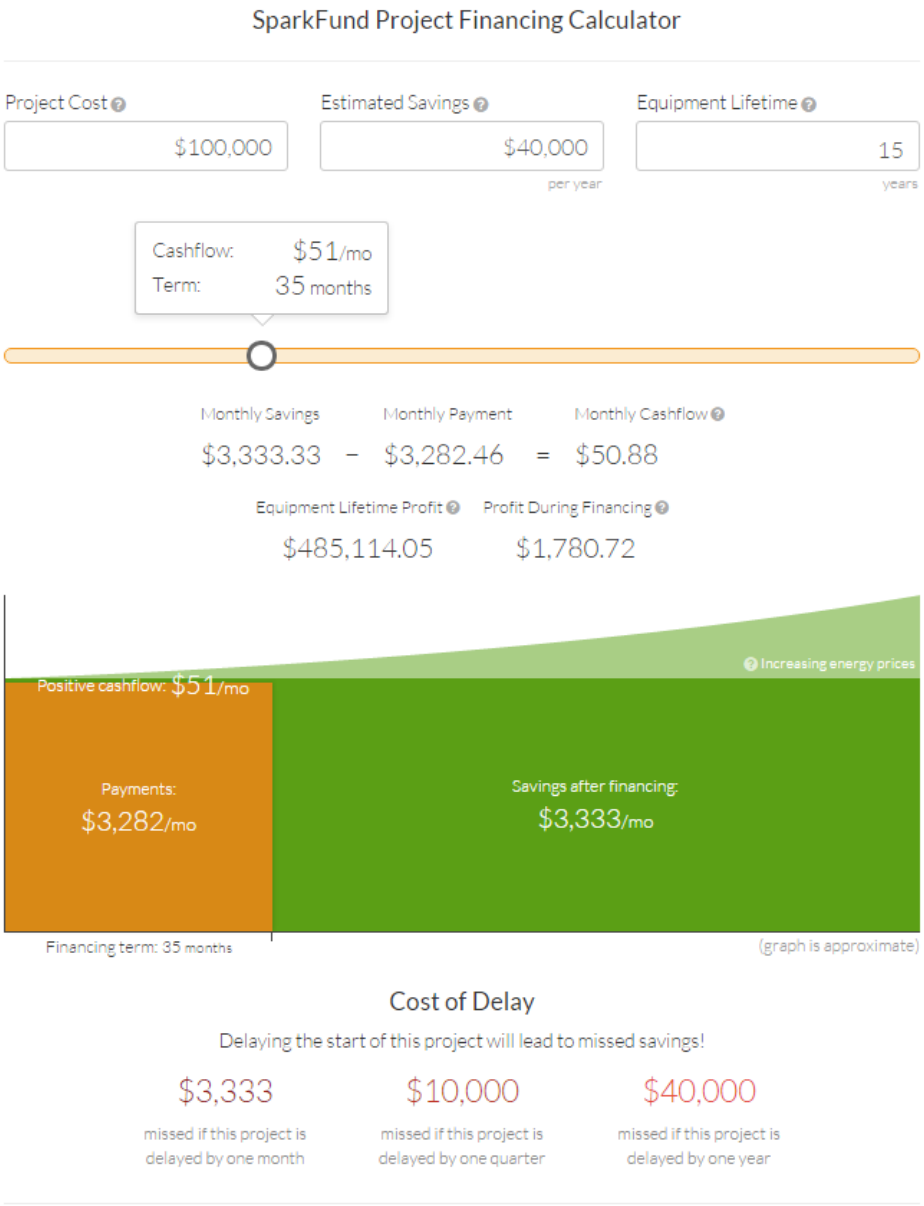

Figure 5: A financing calculator helps organizations visualize the energy savings from retrofits against the cost of financing.

With this knowledge in mind, the organization board (or other decision-making body) should list some financing options they would be willing to consider and communicate these to the project coordinator and auditor, prior to the audit taking place. This will allow the auditor, designer, and contractors to incorporate these financing considerations into their plans. It will also allow the project coordinator to search for financing resources if appropriate. For instance, the Carol Brice Family Center knew at the time of the application that they wished to perform retrofits as multiple smaller projects rather than one time construction so they could self-finance (B. Roth, personal communication, October 21, 2015). With this knowledge, the auditor, designer, and contractors can work with the organization for a plan on how to best implement retrofits.

The program should not require any one financing option. Leaving financing open to the organization to decide upon allows them to use a combination of resources in a way that they are comfortable to them. The financing decision will depend on the audit results, and leaving the option open as to how to finance a retrofit allows more organizations to participate in the program. Offering loan financing is preferred to give organizations another option when grant funding is not available.

Audit

The auditor should make the decision as to whether or not the building requires an ASHRAE Level I or Level II level audit. Level I audits are a broader, ballpark look at the building with some suggestions with estimates on possible energy savings. These audits typically help the building owner decide to proceed with a Level II audit, or avoid that expense and instead focus on recommended improvements.

Allowing the auditor to choose the audit level was suggested by three of the auditors in the FNRP program (J. Fowler, personal communication, March 27, 2015 & P. Beardsley, September 26, 2014 & S. Billa, March 25, 2014). They will be able to use information from speaking with the organization contact about their building goals, timeline, and financing considerations in order to make this decision. This has the following advantages over requiring a Level II audit in all cases:

- Level I audits take less time and are less expensive than Level II audits. In cases where the Level I audit can result in sufficient energy savings, it should be used to save the retrofit program time and money.
- Level I audits have fewer pages than Level II audits. For organizations new to the process with limited construction expertise, these audits are easier to understand and implement.
- Level I audits suggest follow-up recommendations in addition to retrofits. Should a organization receive a Level I audit and complete the retrofits, they can then proceed with the other recommendations with the benefit of added experience with the process.

Both levels of audits should indicate any improvements that require design work, and include an estimate of the cost of the design work together with the cost of the retrofit. For instance, auditors could classify recommended retrofits into three types, as recommended in a statewide program that provided energy audits for domestic violence shelters (Neimeyer, 2014). Retrofits will either require:

1. No additional design work/construction bid ready;
2. Straight-forward design work/design-build bid ready; or
3. Complex improvements that require in-depth design work prior to obtaining a construction bid.

These retrofits should also be in sufficient detail that a bid can be obtained readily from the information in the audit.

Understanding the audit and communicating the results to stakeholders

Auditors try to explain their recommendations to their clients in detail, and provide follow-up assistance with questions as needed. Energy efficiency programs for nonprofits should start with this meeting, but

then provide tools to help the organization contact communicate the results of the audit to the stakeholders and those making financing decisions. Such tools could include a short video that explains terms common to audits (EEMs, ECMs, payback) and a presentation template that could be tailored to distill audit results and recommendations into a short presentation. The presentation should include visual tools to show savings in terms of previous energy costs as well as slides that show audit results in more detail (P. Beardsley, Nortech, personal communication, September 30, 2015). The savings calculations should be presented from the perspective of the building owner so that they know what to expect (Armstrong, 2013). The project coordinator should be available to help the organization with communication of audit results to others, such as members or the board.

The idea that audit results be communicated to the board in a simple and time-efficient manner was expressed by many project participants, including Steve Billa, Carol Brice Family Center board member (personal communication, March 25, 2015), Gary Lewis, Midnight Sun Council Boy Scouts (personal communication, August 13, 2015), and Dave Pelunis-Messier, TCC (personal communication, August 10, 2015).

Design and construction estimate

Audits contain rough estimates of construction costs for suggested retrofits; however, for larger and more comprehensive retrofits a more detailed estimate, or even design work, is often required.

First, the program needs a strategy on how extra estimations and design work will be handled. All parties in the project, from the project coordinator to the organization to the auditor, should be aware of how these tasks will be covered in the project. Providing some level of funding for estimates and design work provides more incentive for organizations to act on the audit recommendations (S. Billa, Nortech, personal communication, March 25, 2015).

Second, estimates up to a certain dollar amount should be covered. For a certain amount of project funds, perhaps up to the cost of an ASHRAE Level I audit ($1000-$2000) the benefit to the organization outweighs the additional funding needed for the program. Funding the estimation allows for a quick transition from audit to construction by eliminating the question of how a organization will pay for the estimate. If the program uses preferred estimation firms that are familiar with the program requirements, auditors, and locations, estimations can be performed at low cost because of the economy of scale (J. Lavoie, Estimations, Inc., personal communication, October 9, 2015). The firm doing the estimation should be given the owner project requirements on the building and timeline so it can be taken into account.

However, extensive design work is expensive and not easily added to program budgets. Also, if the design is to include retrofit work on the building that does not necessarily qualify as energy efficiency upgrades, there may be some conflict with program goals even though it makes sense to have a single design for all upgrades. In this case, there should be a set procedure for offering options to organizations.

In the pilot project, the terms to accept design funds required organizations to commit to a timeline and financing the retrofit. None of the participants were able to accept these terms because they wanted to leave open the option for other funding, and because they wanted to complete the work in pieces and thought they would not be able to meet the timeline. It is difficult to require commitment to a timeline and financing without design results, so our recommendation is not to tie the design funding to future work. Instead, other suggestions include:

- the organization can self-finance the design;
- offer to cover a portion of the design funds as a reimbursement;
- offer small loan financing for design funds; and
- the project coordinator can help the organization search for a grant to cover the design costs.

The detailed estimate or design should take into account the organization's goals and timelines, which should have been incorporated into the audit. The program coordinator should make sure these goals and timeline are conveyed to the estimator/designer so that the estimate and/or design can also take them into account. For example, if the organization wants to complete all retrofits at once, the estimate can provide one number for complete construction. On the other hand, if the organization chooses to use its own maintenance staff for some work, and wants to finance other parts, then the estimate and/or design needs to take that into account to accurately reflect how construction will occur. This saves time and money for everyone, including the contractors who do not have to revisit quotes and timelines for revisions (S. Nelson, Johnson River Enterprises LLC, personal communication, October 9, 2015).

Financing and timeline decision

After organizations have received the audit and explanation, they decide on the timing and financing of a retrofit. Flexible timelines and funding requirements will allow the organization to choose what will work best for them.

The organization must convey its decision to the program coordinator and contractor so that the retrofit construction and program follow-up can take these decisions into account.

Contractors

Some organizations have established relationships with contractors and will not need assistance scheduling construction. Other organizations could benefit from a list of preferred contractors who are familiar with the program. If there is a list of preferred contractors, there should be clear requirements on how to be a preferred contractor and when competitive bidding is required. Furthermore, preferred contractors should be required to undergo a short training on the program to ensure that they are aware of and act in accordance with program goals. Such training ensures the credibility of the program and the achievement of energy savings (Hayes, Nadel, Granda, & Hottel, 2011). It also ensures contractors meet the program's standards for financial and ethical stability and gives contractors the information necessary to market the program (Bell, Hewitt, & Ferrante, 2014).

Retrofit

The program coordinator should remain in contact with the organization during the actual retrofit, and document the time and retrofit activities as they occur. This will aid in the post-retrofit analysis and can be done through the building monitoring procedure.

O&M training

The program should offer resources to help with O&M training during and after the retrofit. Many audits suggest O&M tasks, including setting up a maintenance plan, energy monitoring, implementing an energy committee, and more. Further, an AHFC white paper on the energy use in public buildings found that operator training was lacking, potentially due to high turnover and few opportunities for continuing education for maintenance workers in spite of newer, more complex buildings (Armstrong, R., 2012). O&M training could prevent or address these problems in organization facilities. The resources to implement the training may already be offered through AHFC's Energy Efficiency Technical Assistance Center, in which case the project coordinator can simply help the organization connect with the correct resource. Resources could include:

- videos on common O&M tasks;
- training on energy monitoring platforms;
- training on implementing an energy committee; and
- scheduled check-ins with the maintenance staff by the auditor for 1-year post retrofit.

Occupant training

In addition to training the building staff, the retrofit should include educating building occupants. Occupant behavior is a large driver in energy use, both for permanent building staff and tenants. In fact, a nonprofit energy retrofit program in the Cincinnati area identified nonprofit buildings with split incentives between the nonprofit building owner and the building occupant (for example, if the building occupants do not pay utility bills) as one barrier faced by nonprofits in retrofit programs (ACEEE & University of Cincinnati Economics Center, 2011). Educating building occupants in energy-saving habits is one way to address this barrier. This occurred for one nonprofit in the cohort, the Interior Alaska Center for Nonviolent Living, which found the training very helpful (B. Stanfill, personal communication, October 16, 2015).

Energy efficiency education can be one-time or on-going, in the case of changing residents. Some examples of behavioral training that a future program could offer an organization includes a presentation template to explain to building staff what occurred through the program and why, training for building staff by an outside consultant on energy efficient behaviors and the reasoning behind them, and signage for changing residents on how to save energy.

Post-retrofit analysis

Finally, the program should include a post-retrofit analysis for each participant, to be completed at the conclusion of financing term. The analysis should include documentation of the retrofit, building conditions before and after the retrofit, energy use before and after the retrofit, financial tracking, and an interview with involved parties on their experience with the program. Energy use should be evaluated at least one year after the retrofit completion to ensure that the re-benchmarking is accurate (Armstrong, 2013). This analysis serves several purposes: it allows program staff and funders to judge the program's success in improving building conditions and decreasing energy use; provides feedback to the auditors on how their recommendations and estimates were received and acted upon; and finally, it allows project staff to continually improve the program.

Appendix B: Pilot cohort summaries

Each summary provides additional details on the organizations in the pilot study. This includes information on the organizations themselves, the buildings that received audits as part of the program, retrofits recommended by the audits, the current status of the retrofits being performed, and the financing mechanisms used to fund them. The sources for this information include interviews with the organizations and audits of the buildings.

Readers should remember that the recommendations and the estimations listed in these summaries for construction costs and annual energy savings were from audits completed in 2014 and 2015. Thus, while the recommendations represent best practices at that time, auditors may have different recommendations today. Also, costs and savings estimates would be different using current fuel prices and construction costs.

Alaska Center for Children and Adults (ACCA)

Interview, via email: Heidi Haas, September 25, 2015

The ACCA was incorporated in 1956 as a 501(c)3 nonprofit, first offering services in Speech and Language Therapy and medical equipment loans. Over the years, the center has added more programs in line with its mission and today offers an Infant Learning Program; Early Intervention for Young Children; an FASD Diagnostic Team; Caregiver, Youth, and Community Partner Training Programs; Support Groups; Speech Clinic; Technology User Group; Training Partnerships; and a Medical Equipment Loan Closet.

ACCA applied to participate in the pilot cohort and was admitted by the selection committee. Energy Audits of Alaska conducted a Level II building audit for $3,695, completed in September 2014.

Mission

To assist in improving the lives of people with disabilities and their families by providing quality diagnostic, therapeutic, educational, and referral services in conjunction with other community providers without regard to ability to pay.

Building

The ACCA office consists of two buildings: an older building (3,020 ft^2) and a main building (6,265 ft^2). The older building was constructed in 1956 and the main building was added in 1985. Both buildings have concrete slab foundations and concrete masonry unit walls. Three boilers provide heat to the space, two of which rely on fuel oil #1 and one that relies on electricity. There are two split condenser air conditioning units that provide cooling.

The buildings had undergone previous renovations to improve overall operations. The energy audit calculated a baseline building EUI of 106 kBTU/ft^2/year.

Energy audit recommendations

The energy audit first evaluated the ongoing renovations to the buildings, which included retrofits to replace aging materials, maintenance retrofits, occupancy comfort retrofits, and energy efficiency retrofits. The audit identified missed opportunities in the earlier retrofits:

1. Two condenser units had been replaced with standard units rather than higher efficiency units.
2. A circulation pump was not replaced with a higher efficiency pump.
3. Carbon dioxide-based demand controlled ventilation was not implemented.

This total lost opportunity would have been implemented at an estimated cost of $18,427, for an annual savings of $867.

The audit also recommended additional cost-effective energy efficiency measures, along with others that were cost-prohibitive but were recommended for other reasons, such as reduced maintenance, safety, code compliance, and efficient building management. The total estimated cost of the additional EEMs was $25,347 and would result in a predicted $8,242 in energy savings and $490 in maintenance savings yearly.

1. Replacing incandescent lighting with fluorescent or LED bulbs (audit specified which type to use depending on the building location and the light fixture's type)
2. Installing setback thermostats in vestibules
3. Replacing four desktop PCs with laptops
4. Replacing three existing windows with U-0.30 vinyl windows
5. Insulating hydronic piping
6. Converting oil-fired boilers to natural gas when it becomes available

Additionally, the audit recommended O&M tasks that could reduce energy consumption. Implementing these measures adds an additional $5,100 to the cost of the retrofit and results in an annual predicted savings of $7,045.

1. Implement building monitoring, including installing a cumulative fuel oil flow meter
2. Designate and train an "energy champion" to perform a monthly Energy Checklist walkthrough
3. Maintain doors, windows, and weather stripping
4. Turn off electrical equipment when office is unoccupied and add plug load management devices
5. Implement scheduled lamp replacement instead of replacing lamps one at a time
6. Yearly service of the HVAC system

Retrofit status

Complete. The ACCA completed the retrofit construction at the same time as a renovation project. They completed all recommended retrofits that were feasible– in some cases, the audit suggested something different than they had planned in the renovation and they had to choose which one to implement.

Figure 6: The ACCA was able to incorporate energy efficiency retrofits into an ongoing renovation project.

Financing mechanism

At the same time as this project was going on, ACCA received a grant from the Alaska Division of Commerce, Community, and Economic Development to bring its facility up to code, with a focus on meeting ADA requirements, building codes, client confidentiality, and functional use of existing space. They were able to incorporate the retrofits into the existing construction work.

Alaska Dog Mushers Association (ADMA)

Interview: Paula Ciniero, September 8, 2015

The ADMA has been in Fairbanks for more than 70 years and hosts dog mushing races throughout the winter. Its clubhouse was built in the early 1980s to provide a warm gathering place during races. It is rented out to the community for weddings and gatherings.

ADMA applied to participate in the pilot cohort and was admitted by the selection committee. Wisdom & Associates, Inc. conducted a Level II building audit for $3,325, completed in August 2015.

Mission

To encourage and perpetuate the sport of sled dog racing in Alaska, to improve the breeding and training of the Alaskan sled dog, and to promote the humane treatment of dogs.

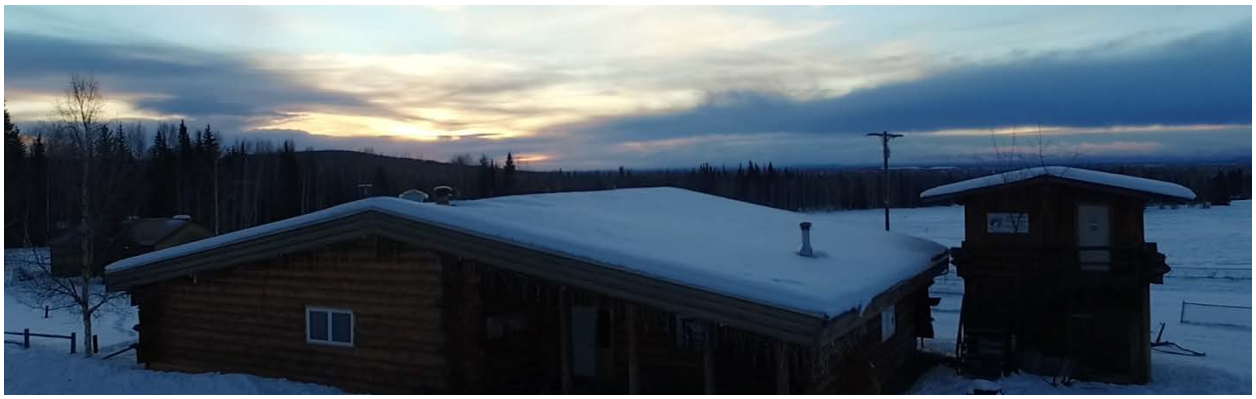

Figure 7: The ADMA hall sits at the entrance to a network of trails for dog mushing.

Building

The ADMA building is a 2,569 ft^2 meeting hall and kitchen. It has log walls, a concrete block floor, and an unconditioned crawlspace. An oil-fired furnace provides heat and an electric hot water heater provides hot water for the kitchen. The building has no whole building ventilation system. Lighting consists of a mix of fluorescent and incandescent bulbs. The EUI reported in the audit was 112 kBTU/ft^2/year. At the time of the audit, annual energy costs, which included electricity and #2 fuel oil, were estimated at $9,955.

Figure 8: The ADMA crawlspace at the time of the building walkthrough by FNRP staff.

Energy audit recommendations

The energy audit found several improvements to be made to the building, including EEMs that were both cost-effective and not cost-effective from a strictly financial viewpoint. Simple paybacks, calculated using fuel prices at the time of the audit, ranged from 0.3 year for the setback thermostat to over 20 years for replacing some of the light bulbs with LEDs. The total cost of the retrofit estimated by the audit came to $25,175, which was predicted to result in an annual savings of $3,687.

1. Setback thermostat
2. Seal and insulate ductwork in the floor. At the same time, replace existing insulation in exposed floor with spray urethane foam
3. Air seal the building envelope to reduce air leakage
4. Replace exterior, arctic entry, dining area, kitchen, restroom, and great room lights with LED bulbs
5. Replace exterior door with an insulated door
6. When replacing the roof, install R-30 loose-fill insulation in the attic

In addition, the audit contained general recommendations to save energy:

1. Details and steps on how to perform air-sealing on building envelope
2. Implement building staff training on energy conservation

3. Utilize the EPA Portfolio Manager to track building performance
4. Turn off non-essential equipment during unoccupied times, or use timers to turn off non-essential equipment during un-occupied times
5. As electrical equipment deteriorates, replace with Energy Star-certified equipment
6. Clean refrigeration equipment evaporator coils on a yearly basis

Retrofit status

The retrofit is ongoing. ADMA has completed retrofits piece by piece as it acquires funding. Currently, it has replaced doors and windows, and is planning to replace the furnace and insulate the floor. Installing roof insulation is planned for summer 2016.

Financing mechanism

ADMA has used, and will continue to use, a combination of volunteer labor and self-financing.

Breadline Inc. – Stone Soup Café

Interview: Jennifer Jolis, August 12, 2015

The Stone Soup Café began as a few concerned citizens handing out sandwiches to hungry people in the early 1980s. Since then, the cafe has made and served food for the hungry in a variety of locations, operating out of churches and the Chief David Salmon Tribal Hall. The nonprofit moved to its current home, a renovated building, in January 2013. That year, it served over 25,000 hot meals to the community.

Stone Soup Café applied to participate in the pilot cohort and was admitted by the selection committee. Nortech conducted Level I and II building audits for $5,018 as part of the project. The Level II audit was completed in November 2014.

Mission

To inspire community collaboration to enrich the lives of our most vulnerable neighbors with nutritious food served in an atmosphere of dignity and respect.

Figure 9: The Stone Soup Cafe is located in downtown Fairbanks.

Building

The Stone Soup Café building consists of a kitchen and dining area. It was built in 1954 and is 3,965 ft^2. The walls are wood-frame and the foundation is a concrete slab. Two boilers provide space heating and DHW to the building.

The building was rehabilitated in 2012 and 2013. The renovation included bringing the plumbing and electrical systems up to code, adding insulation to the roof and front and rear walls (side walls were too close to adjacent buildings), replacing the furnace, and installing a full kitchen with ventilation.

Figure 10: The Stone Soup Cafe has a kitchen and dining area for cooking and serving hot meals to the hungry.

Energy audit recommendations

The Stone Soup Café received both a Level I and Level II audit. The Level I audit suggested several potential upgrades, but did not include estimated construction costs or savings.

1. Add pipe insulation
2. Install head-bolt heater controls
3. Replace lighting with LEDs: a complete lighting survey was recommended
4. Install programmable thermostats
5. Consider solar domestic hot water
6. Install a VFD kitchen hood control system
7. Install an economizer control on the walk-in cooler

The Level II audit recommended two energy efficiency measures. The estimated cost to implement these measures was $3,120 and the annual energy savings was estimated at $2,101.

1. Install an electric hot water heater to use during summer months (rather than rely on the boiler for providing hot water year round
2. Install a programmable thermostat to incorporate a night temperature setback

The Level II audit also recommended a more in-depth look into solar domestic hot water systems.

Finally, the audit provided general measures that conserve energy without the need for capital investment. These energy conservation measures consist of behavioral or operational changes.

1. Consolidate refrigerators and freezers that are near empty or open-faced and unplug units that are not being used
2. Install energy management software on computers that will put them into “sleep” mode when not in use
3. Replace incandescent lamps with LED bulbs
4. Install piping insulation in the boiler room
5. Implement an O&M plan to schedule routine maintenance and monitor energy use

Retrofit status

The lighting retrofit is now completed. They plan to install the electric DHW system in 2016.

Financing mechanism

The Stone Soup Café board considered the loan financing offered by the project, but the total cost of the retrofits recommended by the audit was small enough that they could use building reserve funds and volunteer labor to complete everything. They felt it would be a bad idea to use the loan, and incur interest, if they could avoid doing so.

Carol Brice Family Center (CBFC)

Interview: Ben Roth, Jim Baird, and Patty Mongold on October 21, 2015

The CBFC is a 501(c)3 nonprofit was founded in 1989 to offer space to local nonprofits at below-market rates. The Center takes care of building utilities, maintenance, and capital needs so that nonprofit tenants can focus their resources on their own missions. Today, the building is home to six nonprofits: Head Start, Alaska Health Fair, the Disability Law Center, Thrivalaska, thread's Child Care Assistance Program, and thread's Resource and Referral office.

The Carol Brice center applied to participate in the pilot cohort and was admitted by the selection committee. Nortech conducted Level I and II building audits for $5,681, completed in November 2014.

Mission

To provide a community family center to empower families and improve their quality of life.

Figure 11: The Carol Brice Family Center houses several different nonprofit organizations.

Building

The CBFC building, now over 40 years old, is a wood-frame structure with 25,147 ft^2 of interior space consisting of offices, a daycare, and a kitchen. The building uses natural gas boilers for heating and DHW and electricity for lighting, appliances, and other HVAC equipment. The Level II audit estimated that the EUI for the building is 88.7 $kBTU/ft^2/year$.

The board of directors has been renovating the building since its purchase in 1994. In 2007 they developed a long-term capital improvement plan for the building, consisting of three phases. The first phase, to replace the roof, was completed in 2008 using a grant from the Rasmuson Foundation and volunteer funds. Phases II and III consist of air quality and corridor improvements and building envelope improvements. In 2014, the Phase II renovation began with the installation of new lights and heat recovery ventilators. The audits in this project provided further refinement on Phase II improvements.

Energy audit recommendations

The CBFC received a Level I and a Level II audit. The Level I audit contained energy efficiency measures but did not provide cost or savings estimates.

1. Add pipe insulation to exposed piping in the ceiling space
2. Install head bolt heater controls
3. Consider exterior envelope upgrades if sources of air infiltration are found
4. Upgrade fluorescent and CFL lights to LEDs
5. Consider installing solar domestic hot water so boiler may be shut off in the summer
6. Consider installing a VFD kitchen hood control system

The Level II audit recommended two energy efficiency measures. The audit estimated the cost of implementing these measures to be $34,884 and an annual energy savings of $6,329.

1. Replace remaining interior fluorescent T8 and T12 fixtures with LED fixtures
2. Replace exterior lights with LED equivalents

Additionally, the Level II audit suggested that additional study be conducted on installing a solar hot water system and a solar PV system.

Finally, the audit provided general measures that conserve energy without the need for capital investment. These energy conservation measures consist of behavioral or operational changes.

1. Consolidate refrigerators and freezers and unplug units that are not being used
2. Install lighting control occupancy sensors in conference rooms, closets, restrooms, and storage rooms
3. Install energy management software on computers to put them into “sleep” mode when not in use
4. Install aerators on faucets to reduce water consumption
5. De-lamp the vending machine and install a VendingMiser controller
6. Unplug heat tape in the exterior gutters when the outside temperature is higher than 10°F
7. Implement an O&M plan to schedule routine maintenance and monitor energy use. Such a plan should include a schedule for routine boiler combustion tests and changing filters on HRVs

Retrofit status

The CBFC is currently in the design phase of the retrofit. The board of the directors is searching for funding for a holistic design plan, which will take into account all energy retrofits and the owner’s plan

for the building. They hope to prioritize the retrofits using payback time, the recommended order of improvements from a building science perspective, and building use (for instance, the kitchen is currently a large priority for renovation due to its need for programs).

Financing mechanism

The CBFC is currently searching for funding for the design and construction phases of the retrofit. They considered the design funds offered through this pilot project, but the terms were too strict. Specifically, the board would like to keep the option open of funding the entire project through other means, while the design funds required commitment to funding 33% of the construction through the RCAC loan. Also the scope of the retrofit, which includes extensive envelope work, would be difficult to complete in the 2- year timeframe specified in the design funding terms.

The board of directors plans to use grant funds or building reserve funds to first complete the design document. At that time they will explore fundraising, grants, and loans to fund construction.

Fairbanks Resource Agency (FRA)

Interview: Tom Schneider, October 12, 2015

FRA has provided services to individuals with disabling conditions in the Fairbanks area since 1967. It offers a wide variety of services, including care and support for individuals with disabilities and their families, employment and residential services for adults with developmental disabilities, day services for seniors, caregiver support, crisis prevention services, and more. FRA has over 300 employees and operates three small businesses that employ 150 people with disabilities each year. FRA serves over 1000 people annually with its programs.

FRA applied to participate in the pilot cohort for three buildings and its main building, which sees the most use, and was admitted by the selection committee. Nortech conducted Level I and Level II audits for FRA through this program for a total cost of $7,755. The Level II audit was completed in September 2014.

Mission

FRA is dedicated to assuring that Interior Alaskans with disabilities and their families have equal opportunity to be fully integrated into the community where education, employment, housing, recreation, and family support services are available in the same places, at the same times, and with the same respect afforded any member of the community.

Figure 12: FRA's main building received an energy audit through the pilot project.

Building

The main FRA office is 19,040 ft^2 and was originally built in the 1950s. FRA acquired the building in the 1980s and has performed numerous renovations to the interior, resulting in a variety of window and door types. Currently, the building houses offices, restrooms, storage rooms, and a garage. A core staff

of 40 – 50 people occupies the building during the workweek, with additional clients using the building at various times.

It is heated by two boilers that use #2 fuel oil and uses electricity to power appliances and a domestic hot water heater. At the time of the audit, one of the boilers was failing and in need of replacement. The building also has eight portable air conditioning units and two ventilation units. The audit estimated that the EUI for the building was 106 kBTU/ft^2/year.

Energy audit recommendations

FRA received a Level I and Level II audit. The Level I audit suggested energy efficiency measures but did not provide construction cost or savings estimates.

1. Replace weather stripping at the main lobby entrance
2. Install lighting occupancy sensors in conference rooms, restrooms, and storage rooms
3. Consider de-lamping in some corridors
4. Consider identifying and eliminating sources of air infiltration in the envelope and add insulation between the garage and occupied portion of the building
5. Consider changing the fluorescent lighting fixtures to LED bulbs
6. Replace the failing boiler with a more efficient boiler, re-pipe, and add piping insulation
7. Consider purchasing a boiler that has variable speed pumps and one that can accommodate solar hot water
8. Use programmable thermostats
9. Consider solar domestic hot water

The Level II audit expanded on the Level I recommendations. The audit estimated the cost of installing the EEMs at $67,066 and an annual energy savings of $10,367.

1. Replace incandescent lamps, exterior lighting, and fluorescent T8 and T12 lamps with LED equivalents
2. Replace the two existing boilers with high efficiency units that include a domestic water side arm and storage. Place circulation pump on a timer
3. Use a programmable thermostat to incorporate a night temperature setback
4. Replace old refrigerator in room 44 with an Energy Star qualified unit

Additionally, the Level II audit recommended additional study into the indoor air quality of the building. Monitoring the indoor air quality could justify an upgrade or replacement of the current ventilation system, which has an out-of-date control system and in its current configuration results in exhausted warm air being distributed back into the building in the summer, increasing the summer cooling load.

Finally, the audit provided general measures that conserve energy without the need for capital investment. These energy conservation measures consist of behavioral or operational changes, some were previously mentioned in the Level I audit.

1. Inspect and replace weather stripping at exterior doors

2. Install lighting control occupancy sensors
3. Install aerators on faucets
4. Install energy management software on computers
5. De-lamp the vending machine and install a VendingMiser controller
6. Implement an operation and maintenance plan to schedule routine maintenance and monitor energy use. Such a plan should include a schedule for routine boiler combustion tests, inspecting and cleaning refrigerator condenser coils, and changing filters on air handling units

Retrofit status

FRA has replaced the boilers and re-piped the mechanical room to allow for additional access to the valves and boilers. The other suggestions have been passed to the maintenance department and were incorporated into the maintenance schedule (for instance, updating control systems and replacing light bulbs).

Financing mechanism

FRA utilized a loan from RCAC through this project for the financing of the boiler replacements. Other recommendations are being incorporated into its maintenance budget.

The Greater Fairbanks Community Hospital Foundation (GFCHF)

Interview: Mark Kreiser, September 8, 2015

The Greater Fairbanks Community Hospital Foundation was formed in 1968 to address the health care needs of the Fairbanks community. The foundation raised donor, state, and federal funds to build the Fairbanks Memorial Hospital, which opened in 1972. Today, GFCHF owns the hospital, the adjacent Denali Center, two large medical office buildings, and five smaller medical buildings. It offers health care programs through these facilities, including acute care, skilled nursing services, and care in specialties such as sleep disorders and cardiology.

GFCHF applied to participate in the pilot cohort and was admitted by the selection committee for a vacant building it was interested in renovating. Wisdom and Associates, Inc. conducted a Level II building audit for $3,100, completed in August 2015.

Mission

The Foundation was established to ensure that the community of Fairbanks always has health care by: providing outstanding medical facilities and technology; overseeing an excellent operator; creating an environment that attracts quality, caring physicians who wish to be part of the community; and creating partnerships to deliver quality patient care.

Building

The 1,480 ft^2 building that participated in the program is a commercial medical office building that was constructed in 1987. It is wood frame construction with a concrete block foundation and a conditioned crawlspace. Since purchasing the building, GFCHF has not performed any renovations. However, the foundation plans to complete energy efficient upgrades and then lease the building to one or two medical providers.

The building is heated by an oil-fired furnace and uses electricity for domestic hot water, an air-conditioning unit, and appliances. A fresh air supply in the forced air duct system provides ventilation. The audit estimated that the EUI for the building was 164 kBTU/ft^2/year.

Energy audit recommendations

The energy audit found several improvements to be made to the building, including EEMs that were both cost-effective and not cost-effective from a strictly financial viewpoint. Simple paybacks, using fuel prices at the time of the audit, ranged from 4.1 years for the ventilation EEMS to over 20 years for replacing some lighting that is not used very often with LED bulbs, and installing attic and above-grade wall insulation. The total cost of the retrofit estimated by the audit came to $24,995, which was predicted to result in an annual savings of $2,612.

1. Adjust the fresh air intake on the ventilation system
2. Air-seal the forced-air duct distribution system
3. Replace lights with LED bulbs
4. Install installation in the crawlspace on the masonry walls, perimeter floor, and in the rim joist pocket

5. Replace the exterior door with an insulated model
6. Installing R-30 loose-fill attic insulation
7. Removing old insulation on above-grade walls and replacing with R-21 spray urethane foam

In addition, the audit contained general recommendations to save energy in any building:

1. Details and steps on how to perform air-sealing on building envelope
2. Implement building staff training on energy conservation
3. Utilize EPA Portfolio Manager to track building performance
4. Turn off non-essential equipment during un-occupied times, or use timers to turn off non-essential equipment during un-occupied times
5. As electrical equipment deteriorates, replace with Energy Star-certified equipment
6. Clean refrigeration equipment evaporator coils on a yearly basis

Retrofit status

The retrofit has not yet begun. The building is currently vacant, and the Foundation is working on other projects for occupied buildings first. The Board of Directors will make the decision on when to retrofit the building based on other projects.

Financing mechanism

The Board of Directors will decide how to finance the retrofit when it occurs. In general, they finance energy efficiency retrofits with fundraising, or through a portion of their income–a share of the profits from the Fairbanks Memorial Hospital.

Interior Alaska Center for Non-violent Living

Interview: Brenda Stanfill, October 16, 2015

The Interior Alaska Center for Non-violent Living first opened in 1977 as a rape crisis hotline. Since then it has steadily added services for families in the community who are experiencing violence at home. Today, the center serves over 1,000 people per year.

The center applied to participate in the pilot cohort with two buildings and was admitted by the selection committee. Energy Audits of Alaska conducted Level II building audits for $13,575, which were completed in January 2015.

Mission

A vision of a community free of domestic violence, sexual assault, and child sexual abuse.

Building 1: Main building

The main building for the center serves as both an office building and a residence for up to 60 women and children. It was constructed in 2006 and is 50,750 ft^2. The perimeter walls are concrete masonry units. The building has a crawlspace foundation and a metal truss roof. A natural gas boiler provides heating and domestic hot water. Ventilation is provided by two air handling units and a kitchen ventilation unit supplies make-up air for the stove exhaust hood. Major appliances include commercial kitchen equipment, clothes washers, and resident plug loads. The audit estimated that the building's EUI was 87.1 kBTU/ft^2/year.

Figure 13: The main building for the Center provides shelter for victims of domestic violence.

Building 2: Future suicide prevention hotline building

The second building, currently vacant, is a commercial building with a garage. It is 7,744 ft^2 and was constructed in the 1980s. The foundation consists of a poured concrete slab over a partial basement. Above-grade walls are 2x6 wood studs with fiberglass batt insulation.

The building is heated by an oil-fired boiler with baseboard distribution and an electric water heater provides domestic hot water. Currently, there is no ventilation system as the air handling units have been de-commissioned. There is also no cooling system. The audit estimated that the building's EUI was 84 kBTU/ft^2/year.

Energy audit recommendations for building 1

The Level II audit recommended three different types of retrofits for the main building. The total construction cost for these retrofits is $280,077 with an estimated annual savings of $52,945. The auditor used contractor costs for the construction estimate. Using internal labor would bring the cost down to $267,781.

1. Install occupancy sensors on the toilet exhaust fans in the second floor toilet rooms

2. Replace existing lighting with LED bulbs in the following areas: stove hood, walk-in cooler, kitchen, building exterior, conference rooms, rooms 211 and 213, dining room, offices, garage, corridors, restrooms, storage rooms, janitor rooms, and residence rooms
3. Use a programmable thermostat to set back the temperature in the following locations: garage, warehouse, mechanical room, kitchen, dining area
4. Add a VendingMiser controller on the vending machine
5. Replace 15 desktop PCs with laptops
6. Add a condensing boiler to handle summer and shoulder season heating and add controls to manage both boilers with outdoor temperature reset. Replace pumps with VFD models and put a programmable timer on the DHW re-circulation pump to turn it off from 11 pm to 6 am.
7. Install a thermostatic controller on the roof drain heat trace
8. Install 1.6 gallon per flush manual flush valves in the toilet rooms
9. Use mesh laundry bags for 80% of resident laundry load to use commercial machines in the main laundry rooms
10. Install a CO2-based demand-control for ventilation system
11. Retro-commission and balance ventilation system

Second, the audit provided EEMs that were not cost effective strictly from a financial perspective, but were recommended for other reasons. These retrofits increase the estimated construction cost to $287,539 and the estimated annual savings to $53,203. Again, the auditor used contractor costs for the construction estimate. Using internal labor would bring the cost down to $272,511 total for all recommended EEMs.

1. Replace lighting in the residence pendant fixtures and walk-in freezer with LED bulbs
2. Install occupancy sensing controls to the lighting for second floor restrooms

Finally, the audit recommended O&M tasks that can reduce energy consumption as well as prevent any increases.

1. Implement building monitoring, including installing a cumulative fuel flow meter
2. Designate and train an “energy champion” to perform monthly Energy Checklist walkthrough
3. Maintain door, windows, and weather stripping
4. Turn off electrical equipment when office is unoccupied and add plug load management devices
5. Group vacant offices in the same zone. Turn off lights and turn down heating
6. Yearly service of HVAC system
7. At their end of life, replace all refrigeration and commercial cooking equipment with Energy Star versions

Energy audit recommendations for building 2

The Level II audit recommended three different types of retrofits for the additional building. First, it recommended cost-effective EEMs. The total construction cost for these retrofits is $22,266 and they are estimated to result in an annual savings of $3,559. The auditor used contractor costs for the construction cost estimate, although notes that using internal labor would reduce the cost.

1. Use programmable thermostats to implement a setback temperature in the basement, garage, first floor, and second floor
2. Improve manual switching on the lighting controls for second floor restrooms
3. Replace exterior, basement, stairwell, and second floor lighting with LED bulbs
4. Replace existing boiler with a more efficient version and existing circulation pump with a unit with a variable frequency drive and more efficient motor
5. Install occupancy sensors for ventilation in restrooms

Second, the audit included EEMs that were not cost-effective from a financial perspective but still recommended. These additional EEMs increase the annual savings estimate to $5,905 and the internal labor-cost construction estimate to $33,743.

1. Replace first floor lighting and stairwell lighting with LED bulbs
2. Replace T12 light fixtures in the kitchen, corridor, offices, and basement with T8 fixtures
3. Replace incandescent lighting in restrooms with CFL bulbs and install occupancy sensors

The audit also recommended energy conservation measures that could be implemented by the building's operations and maintenance staff. These measures would cost an additional $6,600 and result in an additional annual savings of $5,109.

1. Implement building monitoring, including installing a cumulative fuel flow meter
2. Designate and train an "energy champion" to perform a monthly Energy Checklist walkthrough
3. Maintain door, windows, and weather stripping
4. Turn off electrical equipment when office is unoccupied and add plug load management devices.
5. Implement scheduled lamp replacement
6. Yearly service of HVAC system

Retrofit status

The Center for Nonviolent Living has started the retrofit process for both buildings. The Alaska Community Foundation is doing grant-funded work on codes and conditions in the buildings for the Center for Nonviolent Living, using the audit and incorporating recommendations into the work. For work outside of its scope, the center will first find a renter for the additional building. This will allow it to have unrestricted funds that can be used to complete the retrofits, or take out a loan to complete them.

Financing mechanism

Retrofits are currently being funded through a grant designated for updating buildings to meet code. Future retrofits will be paid for with cash on hand, or through a loan, once the center finds a renter for space in their additional building.

Interior Community Health Center

Interview: Cheryl Kilgore, August 18, 2015

The ICHC was established in 1993 to offer health care to poor and underinsured people. Initially it was located in the Carol Brice Family Center but moved to its current facility in 2004. Today the ICHC offers well child screenings, physicals, treatment and management of chronic diseases, mental health services, and dental services. In 2013 it served 6,256 patients: 37% had no health insurance and 64% lived at or below 200% of the federal poverty line in Alaska.

ICHC applied to participate in the pilot cohort and was admitted by the selection committee. Energy Audits of Alaska conducted a Level II building audit for $11,495, completed in September 2014.

Mission

To provide universal access to excellent primary health care. It is committed to delivering services in a manner that is sensitive, compassionate, and responsive to the needs of all members of the community.

Figure 14: The Interior Community Health Center expanded to its own facility in 2004.

Building

The building is a 19,590 ft^2 steel frame clinic and is occupied by an average of 150 people during the workweek. The ICHC had previously renovated the building to add a front entrance vestibule, dentist offices, and new front registration areas. The audit estimated that the building's EUI was 138.6 $kBTU/ft^2/year$.

Energy audit recommendations

The audit recommended energy efficiency measures that would reduce energy costs each year. The audit estimated that the construction cost to implement the retrofits was $35,088 with an energy savings of $20,363 per year.

1. Re-program the air-handling unit to run only during occupied times unless there is a call for heating or cooling. Also, close the outside dampers during unoccupied periods
2. Install a timer to deactivate the DHW re-circulation pump during unoccupied hours
3. Implement a setback thermostat for the north vestibule space
4. Install ventilation controller based on CO_2 content
5. Add a clock timer instead of manual switching on the potable water circulation pump
6. Replacement of bulbs throughout the building with fluorescent and LED equivalents
7. Replace an exterior light with an LED bulb

Retrofit status

Complete. ICHC has contracted Siemens for the control recommendations and also switched out the lighting.

Financing mechanism

The center was able to self-finance the retrofits with reserve funds.

Midnight Sun Council, Boy Scouts of America

Interview: Gary Lewis, August 13, 2015

The Midnight Sun Council is one of two Boy Scout Councils in Alaska. The organization has been serving youth in the Fairbanks area since 1960 and offers a number of programs, including the scouting program, a venturing program, learning for life programs, and an exploring program. The organization also lends space in its building to other nonprofits for meetings and trainings. In 2013, it had 1,115 traditional youth members; 8,485 Learning for Life youth members; and 604 registered adult leaders.

The Boy Scouts applied to participate in the pilot cohort and were admitted by the selection committee. Nortech conducted Level I and Level II building audits for $5,596, completed in November 2014.

Mission

To serve others by helping instill values in young people and, in other ways, to prepare them to make ethical choices during their lifetime in achieving their full potential.

Figure 15: The Midnight Sun Council of Boy Scouts of America runs several different programs out of its Fairbanks building.

Building

The BSA building is a 6,600 ft^2 office and meeting space. It was built in 1976 and has a masonry building shell. An oil-fired boiler provides space heating and an electric water heater provides DHW. The building is ventilated by a central air handling unit, which includes coils for heating and cooling ventilation air;

however this ventilation system was disabled at the time of the Level II audit. The Level II audit found that the building EUI was 103 kBTU/ft^2/year.

In 2012, the Boy Scouts applied for a GVEA GoodCents energy audit and have implemented most of the cost-effective recommendations from that audit, including programmable thermostats, motion sensors for lights in bathrooms, exterior door weatherization, upgraded lighting, installation of power strips to mitigate ghost loads, and a boiler replacement. Since then, they have expanded the building by 2,500 ft^2 and renovated the second floor.

Energy audit recommendations

Nortech performed both Level I and Level II audits for the BSA building. The Level I audit suggested energy efficiency measures, but did not estimate construction costs or energy savings.

1. Inspect and replace weather stripping at all exterior doors
2. Add pipe insulation to exposed hydronic piping
3. Add head bolt heater controls
4. Infill portions of north bay windows to reduce infiltration and heat loss in entry ways, while retaining upper windows for daylighting and views
5. Identify and seal areas of air infiltration (the audit mentioned evidence of infiltration at the wall separating the two portions of the building)
6. Address moisture issue in the basement with additional study to determine a possible modification to the air handling system
7. Upgrade fluorescent lighting to LED bulbs
8. Replace the boiler with a more efficient boiler with variable speed pumps, and consider re-piping

The Level II audit provided more specific energy efficiency measures, along with estimates for installation and energy savings. In total, the audit identified six EEMs that would cost an estimated $19,054 to install and result in an estimated annual savings of $5,093.

1. Incorporate a night temperature setback with the programmable thermostat
2. Place electric water heater and pump on a timer
3. Replace exterior lighting with LED bulbs
4. Install a clock timer control on the head bolt heaters
5. Replace interior lighting with LED fixtures
6. Fix damper on air handling unit and identify and other areas of air infiltration

Furthermore, the Level II audit found that EEMs from the 2012 audit had not been performed. The Level II audit did not list these EEMs with the ones above but recommends that they still be implemented.

1. Replace the boiler
2. Add controls on exhaust fans
3. Replace exterior door seals
4. Replace the electric motors on circulation pumps

Finally, the Level II audit recommended several energy conservation measures that can be implemented by maintenance staff for low or no cost.

1. Inspect and replace weather stripping at exterior doors
2. Install lighting control occupancy sensors
3. Install aerators on faucets
4. Install energy management software on computers

Retrofit status

Ongoing. The organization has replaced lighting, added more power strips, installed a headbolt timer, and other smaller items as it was able to. The Boy Scouts also want to replace the boiler but are waiting until they are on the gas line, so they can install a natural gas-fired boiler.

Financing mechanism

Thus far, the organization has implemented EEMs with its operating budget.

North Star Council on Aging (NSCA)

Interview: Darlene Supplee, October 15, 2015

The NSCA was established in 1973. The nonprofit organization serves people 60 years old and older and currently administers the Meals on Wheels program, transportation and chore services for seniors, and exercise classes. It also rents space to the Northern Bridge Club and a local church.

The NSCA applied to participate in the pilot cohort and was admitted by the selection committee. At the same time, it also participated in the Alaska Mental Health Trust Fund Beneficiary energy efficiency program. That program paid for the energy audit and the retrofit, and the NSCA participated in the Fairbanks Nonprofit Retrofit Program for the technical support component. Thus, Nortech conducted a Level I building audit through the Mental Health Trust Fund program, at no cost to this pilot project. The audit was completed in March 2015.

Mission

The NSCA strives to meet the needs of older Alaskans by providing services that enhance and promote quality of life, self determination, independent living, and dignity.

Figure 16: The NSCA serves seniors in the Fairbanks community.

Building

The NSCA building is a wood-frame 5,335 ft^2 commercial living and kitchen space. The building had undergone previous renovations to improve overall operations. Fuel types for the building included fuel

oil for space heating, electricity for appliances, and propane for cooking. The Level I audit estimated the EUI for the building to be 171 kBTU/ft^2/year.

Energy audit recommendations

The Level I audit recommended both no/low cost energy conservation measures, and higher cost energy efficiency measures. The ECMs included:

1. Consolidate refrigerators and freezers and unplug those no longer in use
2. Replace incandescent exit lights with LED versions
3. Replace incandescent lights in the dining area with LED bulbs
4. Install occupancy sensors for lighting in the boiler room and storage rooms
5. Repair weather stripping on exterior doors
6. Replace the broken window in the library

The EEMs were accompanied by rough order of magnitude installation costs and annual savings. The audit estimated the installation costs to be $26,090 and the annual energy savings at $4,162.

1. Insulate hot water piping
2. Install programmable thermostats to lower temperature setpoints during unoccupied periods
3. Install timer on kitchen exhaust fan
4. Replace fluorescent lighting with LED bulbs
5. Replace exterior lighting with LED bulbs

The audit recommended that the NSCA implement all ECMs and all EEMs with a priority of the first and third recommendations, which offered the quickest payback. The audit did not recommend proceeding to a Level II audit.

Retrofit status

Yet to begin. At the time of this report, NSCA had received grant money and was beginning to search for contractors.

Financing mechanism

The retrofits will be financed in full through a grant from the Alaska Mental Health Trust Fund energy efficiency program.

St. Matthew's Episcopal Church

Interview: Ned Gaines, August 21, 2015

St. Matthew's Church has been providing ministry in Fairbanks since the Gold Rush days. It was established in 1904 and has served as a hospital and library. Today, St. Matthew's offers spiritual services, baptisms, weddings, and funerals to the community as well as providing a shelter for the homeless. It hosts Alcoholics Anonymous meetings, veteran support groups, Native community and leadership meetings, and yoga classes. The Church provides breakfast and lunch to anyone who comes on Sundays.

St. Matthew's applied to participate in the pilot cohort with two buildings and was admitted by the selection committee. Wisdom and Associates, Inc. conducted a Level II building audit on both their Church and rectory for $4,175, completed in August 2015.

Mission

We the people of St. Matthew's Fairbanks, AK, receive God's love and are becoming a warm, loving community who share that love with all of God's children.

Building 1: Church

St. Matthew's Church is a log building with an area of 11,787 ft^2. The original building was constructed in the 1940s. Later additions, which were conventionally framed, expanded the parish hall. The foundation consists of an uninsulated basement under the middle section of the building, and uninsulated crawlspaces to the east and west sides. It is heated using district steam heat and has an electric domestic hot water heater. There is no ventilation system. The audit estimated the building to have an EUI of 80 $kBTU/ft^2/year$.

Figure 17: The original church building was constructed in the 1940s.

Building 2: Rectory

St. Matthew's rectory is a wood frame 2,932 ft^2 residence. The original building was constructed in 1970, with a second floor and garage added later. The original section of the building has a basement foundation and minimum insulation in the envelope. An oil-fired heater provides heat and domestic hot water and the building has no ventilation system. The audit estimated the building to have an EUI of 156 kBTU/ft^2/year.

Energy audit recommendations for building 1

The energy audit found several improvements to be made to the building, including EEMs that were both cost-effective and not cost-effective from a strictly financial viewpoint. Simple paybacks, using fuel prices at the time of the audit, ranged from 0.8 years for the use of a setback thermostat to over 20 years for replacing some windows and doors, and installing insulation in the ceiling and floor. The total cost of the retrofit was estimated at $90,943, which was predicted to result in an annual savings of $7,504.

1. Install a programmable thermostats in each part of the building to setback temperature during unoccupied periods
2. Replace the existing water heater with one with a higher efficiency
3. Replace lighting with LED bulbs
4. Add insulation to below-grade and above-grade walls
5. Air seal the building to reduce leakage
6. Add insulation to the crawlspace floor
7. Replace or add insulation to the different areas of the ceiling
8. Replace doors with doors with U-values of 0.16
9. Replace windows with triple pane windows

Energy audit recommendations for building 2

The energy audit found several improvements to be made to the building, including EEMs that were both cost-effective and not cost-effective from a strictly financial viewpoint. Simple paybacks, using fuel prices at the time of the audit, ranged from 0.2 years for changing exterior floodlights to LED bulbs to over 20 years for exterior door and window replacements, installing insulation in the ceiling, and some lighting retrofits. The total cost of the retrofit estimated by the audit came to $39,849, which was predicted to result in an annual savings of $10,775.

1. Install programmable thermostat to setback temperature during unoccupied periods
2. Replace lights with LED bulbs
3. Add fiberglass batt insulation to below-grade masonry wall
4. Replace oil-fired boiler with steam district heating
5. Fill empty cathedral ceiling with fiberglass batts in original house; this would need to be done during a roof replacement. Replace existing ceiling insulation with dense-pack blown-in insulation
6. Air-seal the building envelope

7. Replace exterior doors with insulated doors
8. Replace existing windows with U-0.30 vinyl windows

In addition, both audits contained general recommendations to save energy in any building:

1. Details and steps on how to perform air-sealing on building envelope
2. Implement building staff training on energy conservation
3. Utilize the EPA Portfolio Manager to track building performance
4. Turn off non-essential equipment during un-occupied times, or use timers to turn off non-essential equipment during un-occupied times
5. As electrical equipment deteriorates, replace with Energy Star-certified equipment
6. Clean refrigeration equipment evaporator coils on a yearly basis

Retrofit status

Ongoing. The "self-help" items are being implemented with volunteer labor and self-financing. These include the programmable thermostats, switching lights to LED bulbs, adding insulation, and replacing windows. The largest recommendation is replacing the oil-fired boiler with steam heat. This retrofit remains in the financing stage, as it is expensive.

Financing mechanism

Smaller retrofits have been completed using volunteer labor and fundraising. The church is currently deciding how to finance the boiler replacement. They are considering a loan, but it requires approval by the vestry (a 9-person "Board"; members serve 3-year terms) and the diocese. This process is not fast to begin with, and there have been additional delays because the parish is searching for a new priest.

Tanana Chiefs Conference (TCC)

Interview: Dave Pelunis-Messier, August 10, 2015

The Tanana Chiefs Conference is a traditional tribal consortium of 42 villages in Interior Alaska. TCC was officially formed in 1962, but tribes in the region have been banding together for over 100 years. Today, the tribal organization offers health and social services to members while balancing traditional Native values with modern demands.

TCC joined the pilot project after the application period had ended. It had already received two audits for its two largest Fairbanks buildings through the AEA commercial energy audit program in Spring 2014, and joined FNRP for the technical assistance and the opportunity to use the loan financing. Nortech completed the Level II audits for the AEA program.

Mission

To provide a unified voice in advancing sovereign tribal governments through the promotion of physical and mental wellness, education, socioeconomic development, and culture of the Interior Alaska Native people.

Building 1: Al Ketzler Sr.

The Al Ketzer Sr. building is a 30,000 ft^2 wood-framed building with two wings (one three stories and one single story). It houses office space, conference rooms, kitchens, and lobbies. The building uses district hot water for space heating and electricity for ventilation equipment, appliances, and lighting.

Building 2: Chief Peter John

The Chief Peter John building is a 70,000 ft^2 concrete and metal-frame office building that contains office space, kitchens, conference rooms, and a fitness center. The building uses district hot water for space heating. A well pump that circulates cold water through a cooling coil in the air handling unit provides air conditioning, and domestic hot water is provided by an electric water heater.

Figure 18: The Chief Peter John Tribal Building was the largest building in the pilot cohort.

Energy audit recommendations for building 1

The energy audit for Al Ketzler Sr. recommended six energy efficiency measures. The estimated cost of installing all EEMs was $113,385 and the audit predicted that they would result in an annual savings of $26,276.

1. Repair head bolt heater timers and implement a schedule
2. Reduce run time on air handler #2
3. Re-plumb DHW to use an indirect water heater instead of boilers, and put DHW pump on a timer
4. Reduce run time on air handler #1 and replace motor
5. Retro-commission the HVAC system
6. Replace fluorescent and incandescent lamps with LEDs, and install occupancy sensors

In addition to these EEMs, the audit also recommended low cost or no cost energy conservation measures.

1. Inspect and replace weather stripping at exterior doors
2. Consolidate and unplug refrigerators

3. Install lighting control occupancy sensors in conference rooms, janitor closets, restrooms, and storage rooms
4. Install energy management software on computers
5. Remove electric space heaters (and address comfort issues of employees with district hot water space heating)
6. Implement an O&M plan to schedule routine maintenance and monitor energy use. Such a plan should include a schedule for re-commissioning control systems every 5 years, insulating heat transfer pipes, and creating an energy committee composed of individuals from each department

Energy audit recommendations for building 2

The energy audit for Chief Peter John recommended six energy efficiency measures. The estimated cost to install all the EEMs was $168,507 and the audit predicted the EEMs would result in an annual savings of $61,737.

1. Repair head bolt heater timers and implement a schedule
2. Program the exhaust fan in the penthouse to operate only during occupied hours
3. Replace the electric water heater with an indirect-fired, and put the DHW pump on a timer
4. Install VendingMiser controls on the soda vending machines
5. Retro-commission the HVAC system
6. Replace fluorescent and incandescent lamps with LEDs, and install occupancy sensors

In addition to these EEMs, the audit also recommended low-cost or no-cost energy conservation measures.

1. Inspect and replace weather stripping on exterior doors
2. Cover open-faced refrigerator in the main lobby when not in use
3. Install lighting control occupancy sensors
4. Install energy management software on computers
5. Remove electric space heaters (address comfort issues with district hot water space heating)
6. Isolate flow to backup boilers until needed
7. Implement an operation and maintenance plan to schedule routine maintenance and monitor energy use. Such a plan should include a schedule for re-commissioning control systems every 5 years, insulating heat transfer pipes, and creating an energy committee composed of individuals from each department

Retrofit status

Yet to begin. The retrofits will be incorporated in 2016 through the maintenance department. In some cases, TCC staff will complete the retrofits, and for other items that are not in their maintenance plan, they will contract out the work.

Financing mechanism

TCC's board considered the loan even though in general they are skeptical of taking out loans if there is another means of finance. In the end, the financial department made the decision that they could work the retrofits into the 2016 operating budget and thus the board decided against using loan financing.

Appendix C: Evaluation sheet

Each organization provided information to fill out an evaluation sheet (below) that was used by the selection committee to choose the 2014 project cohort. The building's EUI and ECI were estimated by project staff using building information and energy bills from the previous year submitted in the application. Similarly, the financial profile values were calculated by project staff when available using values provided in the financial audits submitted by the nonprofits.

Evaluation Sheet

Organization Name: _____

Was the application completed according to requirements?	□Yes □ No
Building ownership status?	□Yes □ No
Does the applicant meet financial threshold for lending?	□Yes □ No
Completed notice of intent to apply by March 21st 2014:	□Yes □ No
Completed full application by April 15th 2014 deadline:	□Yes □ No
CCHRC site visit audit recommendation?	□Yes □ No
Alaska Mental Health Beneficiary:	□Yes □ No

Organization's Energy Profile:

Building size:

Building type:

Fuel type:

EUI:

ECI:

Organization's Financial Profile:

Current ratio:	Meets RCAC Lending Guidelines (1):	□Yes □ No
Debt to net:	Meets RCAC Lending Guidelines (4:1):	□Yes □ No

Debt-coverage ratio:	Meets RCAC Lending Guidelines (1.10) :	□Yes □ No
Day's cash:	Meets RCAC Lending Guidelines (90 days):	□Yes □ No
Positive net assets:		
Financial audit:		□Yes □ No

Organizational Narrative:

Preliminary CCHRC Site Visit Notes:

Review Committee Approval for FNRP Participation: □Yes □ No

Appendix D: Fairbanks North Star Borough energy efficiency retrofits

The project coordinator for FNRP also documented the results from a separate energy retrofit project in Fairbanks involving buildings owned by the City and Borough of Fairbanks. These buildings received free audits from AHFC. The AHFC-sponsored audits were conducted in 2012 and contained energy efficiency measures for the buildings that were audited. In both the City and the Borough, some of the audit recommendations were implemented.

The City of Fairbanks implemented several of the recommendations from the audits, with a focus on LED lighting retrofits that had a payback of three to four years. These projects were financed by maintenance appropriations from funds generated by property sales. Other recommendations were not implemented, including recommendations that were not understood or where there was skepticism about the energy and cost savings estimates (P. Sanders, Facilities Manager City of Fairbanks; personal communication; May 2015).

The Fairbanks North Star Borough also implemented recommendations from the audits, focusing on lighting projects and control improvements, implementing energy profiling software, and installing boiler conversions to allow switching between fuel oil and natural gas depending on the relative pricing of each. These retrofits were paid for using borough allocations for energy improvements, which in a typical year consist of $50,000 in two or three installments. There are still outstanding EEMs with quick paybacks from the audits. Also, a few buildings have been updated and would require an audit update (C. Frank, FNSB Staff Energy Engineer; personal communication; May 2015).

There is interest in utilizing financing mechanisms, including bonds and loans, in both the City and Borough for energy efficiency retrofits (J. Jacobson, FNSB Chief of Staff, & J. Hardenbrook, Special Assistant to the Mayor; personal communication, May 2015). However, there are hurdles to overcome including a provision that voters must approve indebtedness. This means a greater lead time for approval to raise funds, and having to time the cost of asking to take on debt with its effect on local elections. Also, both entities are protective of their bond rating and reluctant to jeopardize it (J. Jacobson & J. Hardenbrook, personal communication, May 2015).

Appendix E: Notes on the audit figures in Table 2

Each building is unique, which makes direct comparisons difficult, even with a standardized audit. Some notes on how auditors calculated baseline energy use and costs, retrofit cost, and savings are recorded below to give further context to the figures found in Table 2 in the *Results* section.

Alaska Center for Children and Adults

The ACCA is actually two buildings next to each other; the square footage here is the one used in the AkWarm model. This audit both evaluated missed opportunity in a building retrofit that occurred in 2013-2014 and suggested additional EEMs. Baseline EUI and energy cost are from the AkWarm model calibrated with energy bills pre-retrofit and incorporating the 2013-2014 retrofit measures where possible. The retrofit cost and predicted savings in this chart are from the additional recommended EEMs, and the annual savings includes maintenance savings.

Alaska Dog Mushers Association

Baseline EUI and energy cost from AkWarm model calibrated with utility bills. Retrofit cost estimate and predicted savings includes both cost effective and non-cost effective EEMs.

Breadline Inc. – Stone Soup Café

Baseline EUI and energy cost are from 2013 utility bills. Retrofit cost estimate and predicted savings includes only the recommended EEMs (the audit also included categories for EEMS that were evaluated but not recommended and EEMs that required additional study).

Carol Brice Family Center

Baseline EUI and energy cost are from 2013 utility bills. Retrofit cost estimate and predicted savings includes only the recommended EEMs (the audit also included categories for EEMS that were evaluated but not recommended and EEMs that required additional study).

Fairbanks Resource Agency

Baseline EUI and energy cost are from 2013 utility bills. Retrofit cost estimate and predicted savings includes only the recommended EEMs (the audit also included categories for EEMS that were evaluated but not recommended and EEMs that required additional study).

Greater Fairbanks Community Hospital Foundation

Baseline EUI and energy cost from AkWarm model calibrated with utility bills. Retrofit cost estimate and predicted savings includes both cost effective and non-cost effective EEMs.

Interior Alaska Center for Non-violent Living – Main Building

Baseline EUI and energy costs are from a 3 year average of utility bills. Retrofit cost estimate and predicted savings includes both cost effective and non-cost effective EEMs. Predicted savings includes

maintenance savings. The Center has a maintenance staff, and the retrofit cost estimate assumes they would implement EEMs when appropriate.

Interior Alaska Center for Non-violent Living – Suicide Prevention Hotline Building

Baseline EUI and energy cost are from a mix of 2012 and 2013 energy bills; the building was vacant at the time of the audit so the auditor did not include bills that did not reflect energy use of a fully occupied building. Retrofit cost estimates and predicted savings includes both cost effective and non-cost effective EEMs. Predicted savings includes maintenance savings. The Center has a maintenance staff, and the retrofit cost estimate assumes they would implement EEMs when appropriate.

Interior Community Health Center

Baseline EUI and energy cost are from a 3 year average of utility bills.

Midnight Sun Council, Boy Scouts of America

Baseline EUI and energy cost are from 2013 utility bills.

North Star Council on Aging

Figures are from a Level I audit. Baseline EUI and energy cost are from 2013 utility bills.

St. Matthew's Episcopal Church – Church

Baseline EUI and energy cost from AkWarm model calibrated with utility bills. Retrofit cost estimate and predicted savings includes both cost effective and non-cost effective EEMs.

St. Matthew's Episcopal Church – Rectory

Baseline EUI and energy cost from AkWarm model calibrated with utility bills. Retrofit cost estimate and predicted savings includes both cost effective and non-cost effective EEMs.

Tanana Chiefs Conference – Al Ketzler Building

Baseline EUI and energy cost are from 2013 utility bills.

Tanana Chiefs Conference – Chief Peter John Building

Baseline EUI and energy cost are from 2013 utility bills.