Final Technical Report

Award Recipient: Sault Sainte Marie Tribe of Chippewa Indians

Project Title: Training in Building Audit Technologies

Project Locations: Environmental Building, 206 Greenough, Sault Ste. Marie, MI 49783

DOE Award/Contract Number: DE-EE0005048

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Executive Summary

Federally recognized in 1972, the Sault Ste. Marie Tribe of Chippewa Indians is centered in the eastern Upper Peninsula and northern Lower Peninsula of Michigan. The Tribe currently has a membership of approximately 40,000, with approximately 13,000 members residing in the Upper Peninsula of Michigan and with over 2,000 members residing on trust land in the Tribe's low income housing.

The Tribe currently administers a wide range of social and economic programs such as health, education, social service, housing, law enforcement, judicial, environmental, fisheries, legal, eldercare, and internal administrative services. Funding for a majority of membership services is received through self-governance BIA funding, grants, and profits from casinos and other enterprise businesses owned and operated by the Tribe.

A common denominator to the provision of Tribal programs and services and to the expansion of the Tribal economy is a natural resource base (land) which is under Tribal control. The Tribe began acquiring land in 1972, starting out with 50 acres. Since that time, with an aggressive land acquisition strategy funded by government grants and Tribal resources, a total of 3,000 acres has been secured, including about 450 acres in natural areas and some 39 buildings, which house the Tribal government administration, services, and enterprises. Some of these are newly built but many are older buildings purchased by the Tribe to operate services.

The Tribe's land holdings are primarily in the Eastern Upper Peninsula of Michigan, of which 1,600 acres are held in trust. The Tribe's governmental offices are located in Sault Ste. Marie, with its furthest tribal communities located 180 miles northwest and 120 miles southwest of Sault Ste. Marie. Tribal communities located outside of the Sault Ste. Marie home base are located in remote areas of their county on approximately 10-20 acres. Housing development sites range between 10-150 homes. Most of the service areas have small community centers although the centers are located within 1-2 miles from each housing site.

The Tribe has received and completed two grants from the U. S. Department of Energy (DOE) to carry out energy audits on the governmental buildings. Subsequent plans will be made to undertake energy-conservation retrofits and there will be a need to analyze the effectiveness of these actions. Most of the work to retrofit and to evaluate the effectiveness will be done in-house by existing Tribal staff.

Furthermore, the 508 housing units in Tribal Housing are in need of energy conservation work. Many are older units, some are former Air Force Base housing, and most are occupied by low-income tribal members who struggle to pay utilities in this cold climate. The thousands of Tribal members living off-reservation in the seven-county service area face similar challenges.

At present, all of the energy consumed in Tribal buildings and tribal members' homes (except for wood heat) is provided by local utilities, such as Cloverland Electric Cooperative and MichCon. Reducing the energy demand from tribal buildings will allow us to move forward with sizing renewable energy production to the appropriate and necessary size. For example, some buildings can be outfitted with solar roofs or vertical axis wind turbines, ground source heat pumps for heating, and passive solar heating and cooling. Reducing the energy demand from tribally-owned or member-owned housing will increase tenants' and homeowners' ability to be self-sufficient either through wood heating or more affordable utility costs.

In 2009, the Sault Tribe Environmental Department purchased a FLIR Infrared camera, demonstrating commitment to energy conservation technologies. Since that time, two more cameras were purchased by the Housing Authority. Four additional FLIR Infrared cameras were purchased through an energy audits grant awarded to the Tribe in 2011 by the U. S. Department of Energy. DOE energy grants also funded the purchase of two Minneapolis blower door systems with cases, CO monitors, gas leak detectors, smoke pens and energy audit training materials.

In 2011, the Tribe proposed and was awarded the Training in Building Audit Technologies grant from the DOE in the amount of $55,748 to contract for training programs for infrared cameras, blower door technology applications and building systems. The coursework, which was provided locally to Tribal personnel, was contracted to cover residential and commercial training so that we would be prepared to address the energy audit findings in tribal housing units and governmental buildings.

The project was managed by the Environmental Program Manager for the Tribe, in consultation with the Tribal Facilities Manager and the Housing Director, and with assistance from the Purchasing Department.

Competitive pricing during the procurement of the training contractor resulted in lower costs, allowing the Tribe to request and receive DOE approval to additionally purchase energy audit equipment. Funding from the second DOE energy audits grant allowed us to contract for residential energy audits of low-income Tribal Housing units, which provided a hands-on classroom for the building energy audit trainees.

The equipment purchased through the DOE grants was used to conduct residential energy audits of 25 low-income Tribal Housing units. The residential energy audits, which were conducted by Building Science Academy, provided field experience for Tribal personnel to supplement the DOE funded energy equipment classroom instruction.

Throughout the project period, the Tribe conducted regular progress meetings with the Tribal energy team, processed trainer payment requests, submitted required grant reporting, and attended and presented project updates at the DOE annual program reviews. The Training in Building Audit Technologies grant was completed December 31, 2014.

Building Performance Institute Certifications were achieved by two staff in the Environment Program, as Building Analyst and Building Envelope Professional. Other staff received the same training, but for a variety of reasons, were unable to complete the testing to standards and achieve certifications. However, the knowledge gained is still important and is being put to use.

Staff receiving training included six Housing maintenance staff, three Casino maintenance staff, one arena physical plant manager, four Environmental program staff, one Facilities maintenance manager, and one maintenance person from the Health centers.

Specialized building energy audit equipment was utilized in hands-on training, which resulted in a number of staff in Housing, Environmental, and Facilities becoming very familiar with proper operation of this equipment.

25 Energy Audits were carried out on Sault Tribe housing, looking at the full diversity of housing types and utility constellation. This enables Tribal staff to address the home energy and indoor air quality issues that arise in the future with the diverse home types on the reservations.

The knowledge gained in the training program enabled the Environmental program to draft a Tribal Energy Strategy, with goals for energy reduction and a strategic approach to reducing energy demand in all operations.

The courses and hands-on training by experts in the field have greatly increased the confidence which Tribal personnel have in their capability to address building energy issues safely and professionally into the future. This will enable us to work confidently with engineers and contractors hired to carry out building energy improvements.

Many of the participants in the training courses were surprised to find that the building sciences coursework was more difficult than they anticipated. The courses required great concentration and sustained effort in order to understand what is necessary to carry out building energy work safely. In particular, the material on combustion safety testing is critical to ensuring health and safety of building occupants, and no one should do building energy work without this knowledge. It was challenging material for many of our staff.

Building Sciences training requires math and science knowledge. This surprised many of the participants, and was a barrier to success in the courses. In future, assessment of math and science skills and background would be useful prior to training, in order to address deficiencies and provide remedial tutoring to ensure success.

The time commitment required for this training is a barrier to participation. Because of the intellectual rigor required, a sustained effort is needed in order to learn the material. To take a full week from regular duties is a burden, and in a small governmental organization there is not the depth of staffing to allow for several individuals at once to take that time. As a result, we were unable to train all the staff that we wanted to train. In the case of Facilities maintenance and Housing maintenance staff, to train all or most of that team at once would create short-staffing of a critical program. Therefore, although the training was valued and many staff participated to varying degrees, few were able to complete the courses and obtain certifications.

Staff turnover resulted in some loss of skilled personnel subsequent to the training courses. There is a need for ongoing and recurrent training to retain skills as well as to train new staff. Given the challenges above, it is recommended that Tribal staff with certifications develop an in-house training program to impart the required knowledge and skills to new staff, who then can obtain certifications through an outside training and certification agency. This training program could be developed to address the need for assessment and remedial math/science, as well as the time commitment issues. For example, training could be offered on a continuing basis one afternoon per week, allowing all Facilities and Housing maintenance staff to obtain training while accomplishing their regular workload.

The Tribe would like to acknowledge the U. S. Department of Energy for providing the funding and technical assistance that has made this project possible, and the Tribal Board of Directors for their ongoing support of improving energy efficiencies in Tribal governmental buildings and housing sites.

Project Overview

In 2011, the Tribe proposed and was awarded the Training in Building Audit Technologies grant from the DOE in the amount of $55,748 to contract for training programs for infrared cameras, blower door technology applications and building systems. The coursework consisted of:

Infrared Camera Training: *Level I - Thermal Imaging for Energy Audits – Certification Course*, including Web course about specific camera model (in advance of classroom training), 4 Day Certification, Infrared Camera Operation, Basic Report Generation, Fundamentals of Infrared Science and Heat Transfer Principles, Infrared Weatherization Survey Techniques, Tips and Tricks, Application Examples. Successful completion results in Level I Residential Energy Audit Certification. Course includes the basics of using the infrared camera to find defects in a home and includes using a blower door and thermal camera together and using the results to evaluate the building envelope. Writing a work scope from the infrared thermal images and training in software reporting.

Blower Door Analysis and Building-As-A-System Training, *Building Performance Institute (BPI) Building Analyst – Certification Course*, including Basic Principles of Building Science to Assess Energy Efficiency, Building-As-A-System Approach: All Systems Are Interconnected, HVAC System, Building Envelope, Foundation, Walls, Roof, Doors, Windows, Diagnostic Equipment, Blower Door and Combustion Analyzer, Written and Hands-On Field Exam, Blower Door principles. Course includes zone pressure testing, computer assisted Blower Door procedures and operations, and the basics of using a Blower Door to air seal a home

Building Envelope Training, *Building Performance Institute (BPI) Envelope Professional – Certification Course*, including Building Thermal and Pressure Boundaries, Ways to Enhance Envelope through Insulation and Air Sealing Techniques, How to Analize a Building and Understand Why Moisture, Ice Dams, Mildew and Drafts Were Created. Course includes the procedures of combustion safety testing, the importance of testing, the procedures for Combustion Appliance Zone (CAZ) depressurization testing, combustion appliance testing, gas leak testing, and computer assisted combustion safety testing.

Audit/Job*FLEX* Tablet Software, including the procedures for entering the audit information into the Job*FLEX* software with an emphasis on data collection procedures and accurate interpretation of results. The Tablet can be used to take pictures during the audit, upload a standard material price list and generate a proposal with a scope of work and an estimated price. This will streamline the energy auditing process and provide the Tribe with a baseline figure to conduct retrofit activities.

Competitive procurement of the training contractor resulted in lower costs, allowing the Tribe to request and receive DOE approval to additionally purchase energy audit equipment and contract for residential energy audits of 25 low-income Tribal Housing units.

The Tribe initiated the energy technology training by completing technology trainer procurement. The selected training contractor successfully passed DOE debarment and Sault Tribe

background clearances. The training contract was awarded to Building Science Academy of Sparta, Michigan. The Tribe continued mobilizing for the training by scheduling the trainings, recruiting participants and reserving training facilities.

The Tribe also purchased the DOE approved energy audit equipment, including three Testo 317-3 CO monitors, four Bacharach Leakator™ 10 combustible gas leak detectors, four Regin HVAC smoke pens with wicks, and 6 sets of energy audit training materials, for use by the Sault Tribe Environmental Department and Tribal Facilities Management personnel.

Sault Tribe personnel received field training to supplement the classroom instruction on proper use of the energy audit equipment. Field experience was provided through the second DOE energy audits grant, allowing Sault Tribe personnel to join the contractor, Building Science Academy, in conducting 25 residential energy audits of low-income Tribal Housing units.

Throughout the duration of the energy technology training grant, the Tribe conducted regular meetings with the Tribal energy team and providers to monitor project progress and approve provider payment requests. The energy team also prepared and submitted required quarterly performance progress and financial reporting and presented project updates at the 2011, 2012 and 2014 DOE annual program reviews in Denver, Colorado. Securing this training and certifications for a number of tribal personnel has greatly increased the Tribe's ability to carry out energy saving retrofits to its buildings safely, competently, and professionally.

Objectives

Objectives performed during the Training in Building Audit Technologies project included providing classroom instruction for Blower Door Analysis and Building-as-a-System training, Building Envelope training, and Infrared Camera training, providing field experience to supplement the classroom instruction by conducting residential energy audits of 25 Tribal Housing units with hands-on instruction by a training contractor, and purchasing certain DOE-approved energy audit equipment.

Tasks carried out to meet these objectives included:

- As per established Tribal procurement policies and procedures, preparing and advertising the Request for Proposal for a qualified contractor to conduct the specified energy technology trainings;
- Working with the Tribal Purchasing Department during the public bid opening, analyzing submittals, and recommending award to Tribal Board of Directors for approval;
- Working with the Tribal Legal Department for contract preparation and acceptance;
- Scheduling, recruiting trainees and conducting the technology trainings;
- Purchasing approved energy audit equipment and training materials;
- Scheduling and coordinating residential Tribal housing unit energy audits with contractor, Tribal personnel, Tribal Housing Authority and housing residents;
- Conducting scheduled progress meetings with providers to review project details, process billings, monitor budget compliance, and prepare project communications, including written monthly updates to the Executive Office and Tribal Board of Directors, required quarterly grant progress reports and annual attendance at the DOE Program Reviews in Denver, Colorado;
- Working with provider to complete project close-out checklists, process final billing, prepare report on budget compliance, and prepare final project communications, required final comprehensive grant report and attendance and presentations at the 2011, 2012 and 2014 DOE Program Reviews in Denver, CO.

Description of Activities Performed

During the first phase of the project, the Project Director worked with the Tribal Purchasing Department and Legal Department to procure and contract with Building Science Academy to provide Blower Door Analysis and Building-as-a-System training and certification, Building Envelope training and certification, and Forward Looking Infrared (FLIR) Camera training, including learning how to enter audit data into the tablet software. To maximize availability for Tribal personnel participation, the training was conducted in the Sault Ste. Marie, MI area. Sixteen Tribal personnel, from a combination of the Environmental Program, Housing Authority, Health Division, Facilities Management, and other building maintenance and plant managers attended various segments of the training courses. Due to staff turnover and work schedules, some staff members were only able to attend certain portions of the training.

The Tribe followed established Tribal procurement policies and procedures to secure the services of a qualified trainer to conduct the energy technology training. Procurement activities included advertising a Request for Proposal for an energy technology training company to conduct specified energy technology courses; working with Tribal Purchasing Department to conduct the public bid opening, analyzing submittals, recommending award to Tribal Board of Directors for approval; and working with the Tribal Legal Department for contract preparation and acceptance. To mobilize for the training, the Project Director conducted a pre-project start-up meeting with the selected trainer, Building Science Academy, to sign the contract, review administrative requirements and accounting procedures and finalize the training schedule.

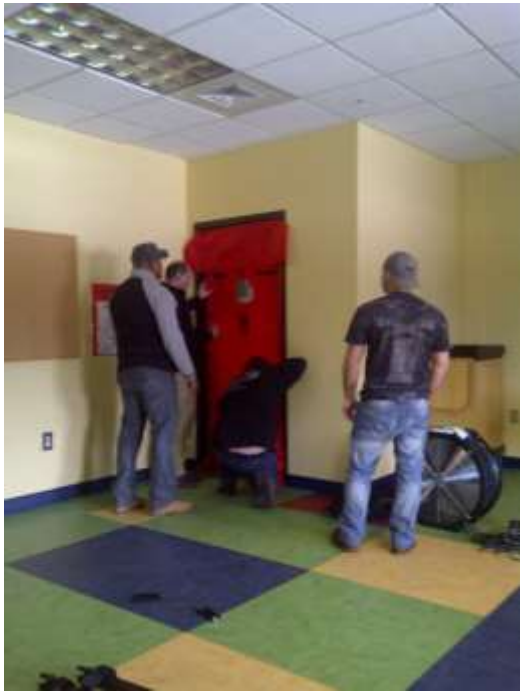
The Project Director also recruited participants from the appropriate departments and reserved training facilities.

The Project Director, project team, Sault Tribe Environmental Department, Tribal Facilities Management and Sault Tribe Purchasing Department purchased the DOE-approved energy audit equipment and training materials.

The Project Director worked with the Sault Tribe Housing Authority to schedule and coordinate energy audits of 25 Tribal Housing units with the residential energy audits and training contractor, Tribal personnel, and housing residents to ensure the availability of housing units and to provide the opportunity for hands-on field experience for Tribal personnel.

The project team also met to monitor budget compliance and prepare project communications, including updates to the Executive Office and Tribal Board of Directors, other project communications, required reporting and presentations. Project progress and financial status were documented in quarterly reports submitted electronically to DOE. Project status was also presented at the 2011, 2012 and 2014 Annual Tribal Energy Program Reviews held in Denver, Colorado.

Photos – Technology Training



Photos – Equipment

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Conclusions and Recommendations

Building Performance Institute Certifications were achieved by two staff in the Environment Program, as Building Analyst and Building Envelope Professional. Other staff received the same training, but for a variety of reasons, were unable to complete the testing to standards and achieve certifications. However, the knowledge gained is still important and is being put to use.

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Lessons Learned

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