

2010 Project Abstract

PROJECT TITLE: **Demonstrating Sustainable Energy Practices at Residential Environmental Learning Centers (RELCs) – Long Lake Conservation Center (7d-5)**

Project Manager: Ross Wagner
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Fax Number: (218) 927-7374
Web Site Address: www.llcc.org

Location: Aitkin, Cass, Fillmore, Lake, Pine, and St. Louis

Total ENRTF Project Budget:	ENRTF Appropriation	\$240,000.00
	Minus Amount Spent:	\$202,641.05
	Equal Balance:	\$ 37,358.95

Legal Citation: M.L. 2010, Chp. 362, Sec. 2, Subd. 7(d5)

Minnesota's six Residential Environmental Learning Centers (RELC) including Long Lake Conservation Center (LLCC) teamed up to obtain grant funding to reduce their carbon footprints and provide energy education that focuses on renewable energy. In order to get the most value from the energy efficiency measures a study was conducted for each RELC. As a result, a series of recommendations were given to reduce carbon and energy consumption. Each RELC is unique, so recommendations varied between them. Specifically for LLCC, the recommendations were to improve the energy efficiency in campus buildings, convert campus lighting to solar and LED's, design and install solar energy sources for the Northstar Lodge and Dining Hall.

LLCC goals for this project were;

- 1) Increase conservation measures and energy efficiency in the targeted buildings.
- 2) Invest in renewable energy technology applications that LLCC currently does not have.
- 3) Use these conservation measures and renewable energy applications to educate users on making choices about conservation and renewable energy options that are applicable to their everyday lives.

All three goals have been met and the project was under budget.

In 10 years this collective education program will reach nearly 100,000 people who will attend LLCC and participate in its programs. This includes 55-60 K-12 schools annually and a number of other colleges and organizations who use LLCC.

The project is completed with the monitoring equipment installed and tested during the last week in June. Final installation and testing of the Solar Panel for the Dining Hall was completed in May, 2012. An issue with the Mille Lacs Energy Cooperative regarding the 3 Phase inverter was solved resulting in the final installation. The issue was technical in nature and the inverter's Manufacturer's specifications were submitted to Mille Lacs Energy Cooperative, which they approved. The experience could assist in future solar projects with the cooperative. Overall the project went very well. However, over the 4th of July Holiday, LLCC experienced a lightning strike that disabled the entire phone system and the Directors computer, where the monitoring software was loaded. Aitkin County IT Department has rebuilt the computer and has re-installed the system at LLC. The phone system was also just recently repaired.

Environment and Natural Resources Trust Fund (ENRTF) 2010 Work Program Final Report

Date of Report: 8/12/12
Date of Next Progress Report: Final Report
Date of Work Program Approval: 6/9/2010
Project Completion Date: 6/30/2012

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Appropriation Language:

\$1,500,000 is from the trust fund to the commissioner of natural resources for agreements as follows: \$206,000 with Audubon Center of the North Woods; \$212,000 with Deep Portage Learning Center; \$350,000 with Eagle Bluff Environmental Learning Center; \$258,000 with Laurentian Environmental Learning Center; \$240,000 with Long Lake Conservation Center; and \$234,000 with Wolf Ridge Environmental Learning Center to implement renewable energy, energy efficiency, and energy conservation practices at the facilities. Efforts will include dissemination of related energy education.

II, III. FINAL PROJECT SUMMARY:

Minnesota's six Residential Environmental Learning Centers (RELC) including Long Lake Conservation Center (LLCC) teamed up to obtain grant funding to reduce their carbon footprints and provide energy education that focuses on renewable energy. In order to get the most value from the energy efficiency measures a study was conducted for each RELC. As a result, a series of recommendations were given to reduce carbon and energy consumption. Each RELC is unique, so recommendations varied between them. Specifically for LLCC, the recommendations were to improve the energy

efficiency in campus buildings, convert campus lighting to solar and LED's, design and install solar energy sources for the Northstar Lodge and Dining Hall.

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IV. OUTLINE OF PROJECT RESULTS: Implementation of carbon and energy reduction systems for education and demonstration purposes at Long Lake Conservation Center. Budget \$240,000. Completion Date June 30, 2012.

RESULT/ACTIVITY 1: Implementation of carbon and energy reduction systems for education and demonstration purposes at Long Lake Conservation Center. Budget \$240,000. Completion Date June 30, 2012.

Description: Long Lake Conservation Center (LLCC), an RELC situated on 760 acres is located in northeastern Minnesota near the towns of Aitkin and Palisade. The facility is owned and operated through Aitkin County. Every year around 10,000 users come to learn about the ecology of the Arrowhead region of Minnesota and how to be good environmental citizens.

The McKinstry study done at Long Lake Conservation Center showed that each one of nine buildings on the property was in need of envelope improvements to improve energy efficiency. Certain buildings were shown to have capabilities to have solar applications to reduce dependency on grid electricity. Some buildings also were shown

to have opportunities for reducing dependency on propane use through updates of air/heating systems. Outdoor lighting was indentified as well for helping reduce energy dependence and further solar applications.

The targets identified from the McKinstry study to use ENRTF funds for is our dining hall, two dormitories and current outdoor campus lighting systems. One of these buildings was constructed in the mid eighties with the other two being built in the late nineties. All three buildings see a significant amount of use by our users. With these three buildings using the majority of hot water, installing a solar application to one dormitory and the dining hall, while updating the control systems in the other dorm which already has the capability to heat domestic hot water with current bio mass wood boiler system in use on campus to be a good application of funds. Solar LED applications will be applied to the campus lighting system and indoor lighting in multiple buildings to reduce the dependency on grid electricity and to increase efficiency. The reasons these applications from the McKinstry study were chosen is: 1)they have the ability to reduce LLCC’s carbon production the most while increasing efficiency; 2)the applications use a renewable energy application; 3) and they all can be used for demonstration purposes for educating users on their benefits to reduce carbon. A design/build team will be brought in to help develop and oversee the best way to accomplish these goals. Monitoring equipment will also be installed this time on the new and existing systems to establish base line data and monitor improvements.

Summary Budget Information for Result/Activity 1:

ENRTF Budget: \$ 240,000.00
Amount Spent: \$ 202,641.05
Balance: \$ 37,358.95

Deliverable/Outcome	Completion Date	Budget	Estimated Carbon Reduction #'s
1-1 Solar Hot Water installed in two buildings	<u>6/30/12</u>	\$71,690	75,008
1-2–Update Bio mass domestic hot water controls in one building	<u>6/30/12</u>	\$4,900	31,812
1-3 Campus outdoor and indoor lighting installed	<u>6/30/12</u>	\$75,410	41,600
1-4 Monitoring equipment installed	<u>6/30/12</u>	\$88,000	0

Result Completion Date: *June 31, 2012*

Result Status as of 1/10/2011: 1/10/2011: Following approval of the LCCMR grant by the state legislature for Long Lake Conservation Center, a search was done to secure a professional design/build team to contract with for design/oversight of installation of carbon and energy reductions systems as listed and outlined in IV. Outline of Project Results. Request for proposals were sent to three companies who showed interest in the project. Two companies submitted proposals and were interviewed by the project

manager and a consultant helping all six RELC's with their projects. From these interviews, Wagner-Zaun Architects and Conservation Technologies a co-business group was awarded the contract.

Since the approval of the contract, an initial meeting was held between the project manager and Mike LeBeau who would be leading the design of systems to be installed. Through this meeting, the project manager identified the spring of 2011 as being the best time to install the new systems. This was done due to the lateness of the time of year (October 2010), by the time the search process was completed. By working towards a late spring/early summer installation, ample time would be given for an appropriate design for the systems and to allow for any issues that may arise with developing a design to work with existing buildings. As a result of this change in plans, the completion date of 12/31/10 for the deliverables was unable to be met. The deliverable completion date has been changed to reflect this. Since the time of the meeting, two more meetings have taken place with Mr. LeBeau gathering information on the facility and working with the project manager to come up with design parameters. At the time of this progress report, the designs are currently being drawn-up for the deliverables outlined in this work program.

Result Status as of 7/15/2011: 7/15/2011: During the course of pre-design work it was discovered LLCC needed to amend its work program. Through the amendment process this was accomplished in late April 2011. Mike LeBeau of Conservation Technologies then proceeded to complete the designs for all systems to be installed at LLCC. He then commenced to develop and write all the construction documents and specifications to allow for bidding to take place on the various deliverables outlined in this work program. Due to needing to amend the work program, this process was delayed and the project was unable to get started in the spring of 2011 as earlier identified. Once all construction documents were completed deliverable 1-1 was let out for bids. Unfortunately, not enough bids were received to make it a competitive process. This deliverable needed to be put out for bids again with these being due by the end of July. As a result of this and having to amend LLCC's work program, the completion date of 7/30/2011 will not be obtainable. The goal has now been set to have deliverable 1-1 completed by September 2011. Other deliverables outlined in the work program will also be bid out in the next several weeks with the hopes of them being completed by late September as well. These developments have forced LLCC to move back our completion date to 12/31/2011. Please note the deliverable completion date has been changed to reflect this.

Result Status as of 1/15/2012: An amendment to change the date for completion of deliverable is included at the top of this report. Envelope improvements have been completed by Northway Construction Services and their sub contractors. Other deliverables now complete are exterior lighting and the solar work at the North Star Lodge. Remaining deliverables that have yet to be completed consist mainly of the Solar work at the Dining Hall and installation of the monitoring equipment. Dining Hall Solar work is being worked on as of this report, work is expected to be completed by the end of January. This brings the project to the remaining deliverable of the monitoring equipment and installation. Previously, Mike LeBeau, Todd Roggenkamp and Ross Wagner met with representatives of Peoples Electric Co. Inc, DBA as System One Control. A work plan was agreed upon based on Wagner Zaun Architects with input

from Mr. LeBeau. As a result, the monitoring will be campus wide with a computer running the results placed in the Administration Building. Additional station may be placed in a classroom setting as well. System One is expected to begin their work end of January.

V. TOTAL ENRTF PROJECT BUDGET:

Contracts: Professional/technical assistance for a design/build team (to be determined through competitive process) \$28,400

Supplies: \$0

Capital Improvements: Renewable: Solar Hot water \$59,690= 60%
equipment/40% installation

Conservation: Mechanical improvements \$4,500= 60%
equipment/ 40% installation

Conservation: Campus lighting \$67,410= 70% equipment/30%
installation

Monitoring Equipment: \$80,000= equipment 70%
equipment/30% installation

TOTAL ENRTF PROJECT BUDGET: \$240,000

Explanation of Capital Expenditures Greater Than \$3,500: The capital improvements made with these funds are fixed capital assets and will remain in place and will continue to be used for the same program through its useful life.

VI. PROJECT STRATEGY:

A. Project Partners: Audubon Center, Sandstone; Deep Portage, Walker; Eagle Bluff, Lanesboro; Laurentian, Britt; Long Lake, McGregor; and Wolf Ridge, Finland.

B. Project Impact and Long-term Strategy: The RELCs sustainable energy campaign has two phases or main goals. Phase 1 is to retrofit our campuses using conservation, efficiency, and renewable resources to reduce the RELCs collective carbon emissions by 80% and lower energy costs. The ENRTF funds will be used to implement one quarter of the Phase 1 goal and sets the stage for our Phase 2 educational programs. Long Lake Conservation Center will continue to seek funds until all of the Phase 1 work identified in the McKinstry report is completed. Phase 2 is to create and implement education efforts that compliment the building improvements done in Phase 1, thus using the campuses as models for sustainable retrofitting and practical carbon-neutral lifestyles. Long Lake Conservation Center currently uses 5 GARN wood burning units to heat all of Long Lake's campus buildings. The ENRTF funds will allow us to expand our renewable energy use by introducing solar hot-water technology and solar campus lighting. This added technology will help to significantly increase the energy conservation and efficiency of three of our buildings as well as the whole campus proper. Monitoring equipment will also be installed to track

our renewable energy technology and help maintain a high level of energy efficiency and for use in our education programs in Phase 2.

B. Funding Sources	Overall RELC Project	Long Lake Conservation Center
LCCMR 2010 Request - Pending	\$1,500,000	
2009 Federal Allocation - \$300,000/ctr. – 5 Northern Ctrs. - Pending	1,500,000	
2010 Federal Allocation - \$300,000/ctr. – 6ctrs. – In Process	\$1,800,000	
Federal Stimulus EECBG Grant – Long Lake – Under consideration		\$100,000

C. Other Funds Proposed to be spent during the Project Period:

C. Other Funds	Overall RELC Project	Long Lake Conservation Center
In-kind Staff - \$30,000		\$5,000 per ctr.
2009 Federal Allocation - \$300,000/ctr. – 5 Northern Centers	\$1,500,000	\$300,000
Continue Project Development – Butler Family Foundation	\$30,000	
2010 Federal Allocation - \$300,000/ctr. – 6ctrs. – In Process	\$1,800,000	

D. Spending History:

D. Spending History	Overall RELC Project	Long Lake Conservation Center
Bush Foundation – McKinstry Study	\$176,000	
Butler Family Foundation – Project Development	\$30,000	

VII. DISSEMINATION: Information about this project will be disseminated through a collaborative website that will be available to the public for learning about the process and successes of each individual centers projects. Long Lake Conservation Center (LLCC) will also have information available on its own website as well as the Aitkin County Government website. LLCC will also put this information out in its newsletter, email blasts, and through articles/press releases through local paper media. It will also be discussed in all future New Energy Resource Advisor (ERA) training seminars to be held on-site at each center.

Update 1/10/11: Collaborative website is currently under construction and is nearing completion. Along with this, a general statement has been crafted to be inserted into

LLCC's website about the overall project. A short article was released in the local paper in August of 2010 outlining the event of LCCMR rewarding the grant to LLCC and the other five RELC's. Plans are also in place for LLCC to partner with a local college Central Lakes College to host an ERA training seminar at LLCC.

Energy Resource Advisor (ERA) Certificate

This curriculum is the *first of its kind in Minnesota*. It is a non-credit, continuing education course for adults 18 years of age and older, using online instructional technology combined with applied, field experience. It is intended to foster understanding and leadership of environmental sustainability in our communities, homes and workplaces. This class will be taught online as well as having a contextual field component. The contextual field component will give participants a chance to apply knowledge gained to real world challenges. After completing this course, the successful participant may serve as an energy resource advisor and "green" consultant in the community and workplace.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than 1/15/2011, 7/15/2011, and 1/15/2012 A final work program report and associated products will be submitted between June 30 and August 1, 2012 as requested by the LCCMR.

Attachment A: Budget Detail for 2010 Projects - Summary and a Budget page for each partner (if applicable)

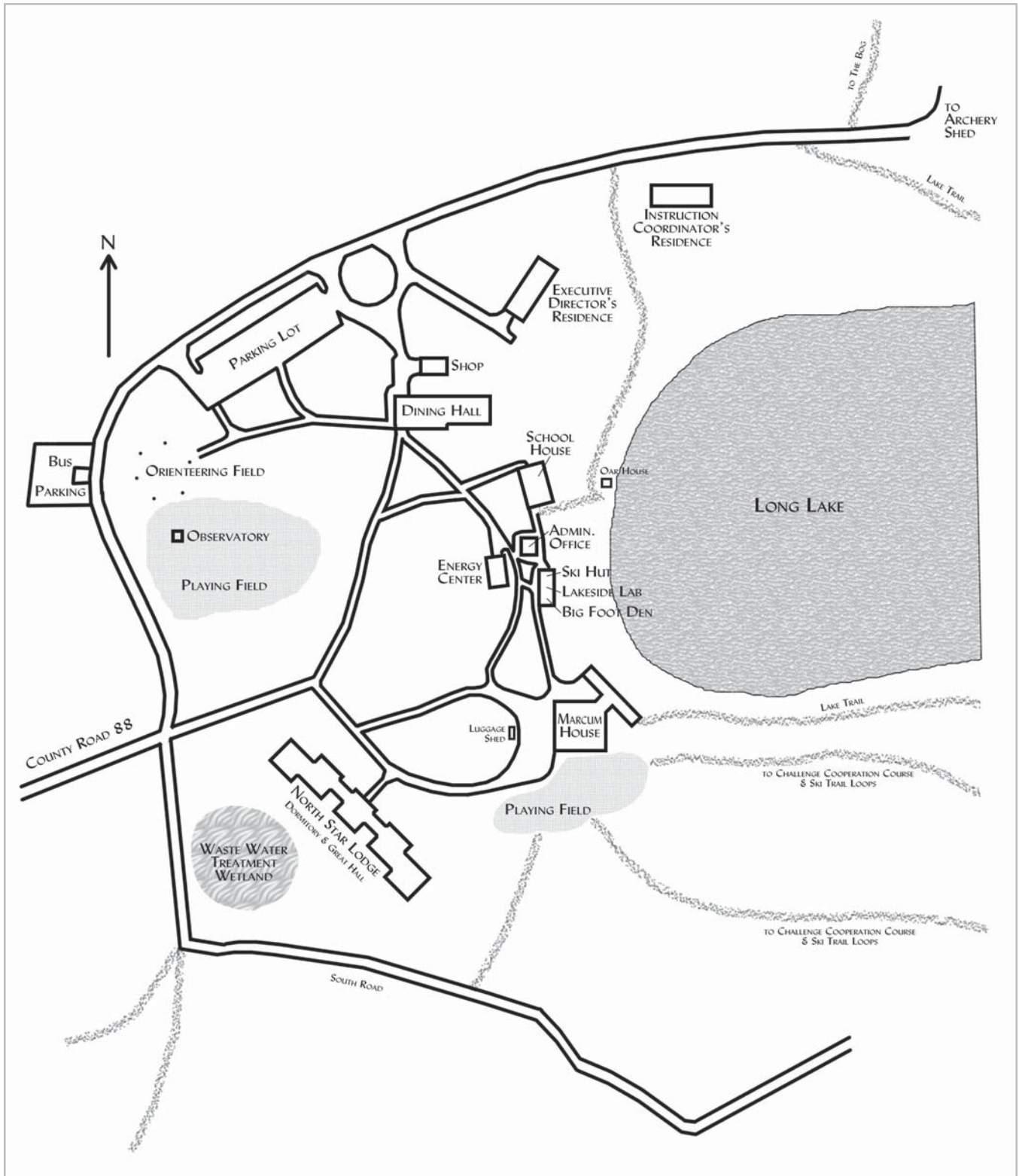
Project Title: Demonstrating Sustainable Energy Practices at Residential Environmental Learning Centers (RELCs) 7d-5 Long Lake Conservation Center

Project Manager Name: Ross Wagner

Trust Fund Appropriation: \$ 1,500,000

2010 Trust Fund Budget	<u>Revised Result 1</u> Budget 10/04/11	Amount Spent (7/1/12)	Balance 7/1/12	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM					
Contracts					
Professional/technical- for design/build (contractor will be determined through competitive process)	28,400	28,400	0	28,400	0
Capital equipment over \$3,500					
Installation of Bio-mass controls 4/15/11	4,500		4,500	4,500	4,500
Renewables-Solar Hot Water- 60% equipment,40% installation	59,690	56,975	2,715	59,690	2,715
Conservation-Campus Lighting- 70% equipment, 30% installation	67,410	48,618	18,792	67,410	18,792
Monitoring Equipment-70% equipment,30% installation	80,000	68,648	11,352	80,000	11,352
		0			
COLUMN TOTAL	\$240,000	\$202,641	\$37,359	\$240,000	\$37,359

LONG LAKE CONSERVATION CENTER CAMPUS MAP



Long Lake Conservation Center LCCMR Project



The Solar Array for the Long Lake Conservation Center Dining Hall Building, the Dining Hall is in the background. Originally the array was going to be placed closer to the building but the area it is in now offers a better solar view.



From the solar array, lines go to the meter box.



From the meter box to the Dining Hall.



Feronius Converter located in Dining Hall Electrical Room.
Last stop for the solar electricity.



Hot Water Solar Array for the North Star Lodge building at Long Lake Conservation Center. Trenching to the North Star Lodge is still evident in the right hand photo.



Hot water enters the North Star Lodge, line is protected by PVC pipe.



Monitoring equipment at the North Star Lodge for the Solar Hot Water.



Heated water is stored in one of two 10,000 gallon hot water heaters in the North Star Lodge.



Biomass Controls were installed in the Energy Center.