

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

Date of Report: 1/28/2010
Date of Next Progress Report: 1/15/2011
Date of Work Program Approval:
Project Completion Date: 6/30/2012

I. PROJECT TITLE: Demonstrating Sustainable Energy Practices at Residential Environmental Learning Centers (RELCs) – Wolf Ridge Environmental Learning Center (7d-6)

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Location: Aitkin, Cass, Fillmore, Lake, Pine, and St. Louis counties (Wolf Ridge is in Lake County).

| | | |
|------------------------------------|----------------------------|-----------|
| Total ENRTF Project Budget: | ENRTF Appropriation | \$234,000 |
| | Minus Amount Spent: | \$ 0 |
| | Equal Balance: | \$234,000 |

Legal Citation: M.L. 2010, Chp. 362, Sec. 2, Subd. 7d6

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. PROJECT SUMMARY AND RESULTS: Six Residential Environmental Learning Centers (RELCs - Audubon Center, Deep Portage, Eagle Bluff, Laurentian, Long Lake and Wolf Ridge) will reduce their carbon footprints while disseminating energy education that focuses on renewable energy, energy efficiency, and conservation options. The centers, supported by Bush and Butler foundations, chose to invest in a professional energy audit utilizing the engineering and consulting firm McKinstry, Inc. The audit at Wolf Ridge evaluated 8 existing buildings for energy integrity, our current

mechanical and heating systems, and energy uses that resulted in state-of-the-art recommendations for energy efficiency measures, renewable energy possibilities, and demonstration opportunities. Due to the variations of each center's location, the suggested solutions made by McKinstry, Inc. make the combined effort of all six centers important for statewide dissemination. McKinstry's study is the basis for our collective energy investment and education development request.

The Environment and Natural Resources Trust Fund (ENRTF) will allow Wolf Ridge to: 1) improve the energy efficiency and increase conservation measures in two buildings that are central to our operations; 2) further invest in renewable energies by adding solar thermal technology to a residential building, 3) monitor energy use and energy savings to collect baseline data and monitor improvements, and 4) incorporate these efficiency and renewable energy applications into our two climate change lesson plans that educate our users about energy conservation and renewable energy options applicable to their home, communities, and schools. Wolf Ridge provides on-site programs for 17,000 people per year. Since all of our participants will be exposed to the ENRTF applications on campus, Wolf Ridge has the potential for educating 170,000 people of all ages over the next 10 years.

Collectively for all six centers, a web consultant will design and construct a website showing each center's energy related information for educational use while providing statewide verification of the engineering and installation results. Eagle Bluff will coordinate the collective efforts of the six centers to achieve Results 2, 3, and 4. Wolf Ridge will work collectively with the other centers to develop evaluation, monitoring, and outreach components that can be used by all the centers. This will insure that all users receive consistent messages and information.

III. PROGRESS SUMMARY AS OF: 11/30/2009

IV. OUTLINE OF PROJECT RESULTS: Implementation of carbon and energy reduction systems for education and demonstration purposes at Wolf Ridge Environmental Learning Center. Budget: \$234,000. Completion date: June 30, 2012.

RESULT/ACTIVITY 1

Description: Wolf Ridge Environmental Learning Center is located in northeastern Minnesota off the shore of Lake Superior and near the town of Finland, MN in Lake County. Wolf Ridge was established in 1971 as a private 501(c)3 accredited residential outdoor school. Funding is primarily through program fees. We serve about 17,000 users a year and teach environmental science, natural and cultural history, team building and personal growth, and outdoor recreation.

Overall, the McKinstry, Inc. report for Wolf Ridge showed that seven of our buildings need envelope improvements to both conserve energy and improve energy efficiency. Three of the buildings are excellent candidates for solar hot water applications with six buildings benefiting from instantaneous domestic hot water back up. One building needs an upgraded air handling and ventilation system; one building is a candidate for total solar heating, and an opportunity exists to recover the waste heat from our refrigeration

compressors. McKinstry, Inc. recommends converting our propane domestic hot water system in the wing of one building to the existing wood heat source used by the other wing. Outdoor and indoor lighting improvements will help reduce electrical energy use. Replacing our degraded underground heat pipes around campus will vastly improve the efficiency of our wood/hot water heating system--- we are currently implementing this improvement through another funding source. Sub-metering at all buildings to collect baseline energy use and to monitor improvements was also a recommendation.

The specific targets for the Environment and Natural Resources Trust Fund funding are: 1) address envelope improvements in the Dining Hall and East Dorm by adding significant levels of insulation and re-establishing a continuous air barrier in the walls, ceilings and crawl space. The exterior and entry way doors will be replaced with high efficiency units in three of the buildings; 2) continue to improve the efficiency of interior lighting around campus by replacing T-12 light fixtures with T-8 light fixtures and installing motion sensor switches; 3) convert the existing walk-in cooler and freezer to water-cooled condensers and apply the waste heat to the domestic water heating system serving the Dining Hall; 4) convert the propane domestic hot water system to a solar hot water system in the West Dorm by installing solar thermal panels, re-using the existing heat exchangers and adding storage capacity, and 5) install utility sub-metering and monitoring equipment campus-wide to establish baseline data and monitor energy improvements.

The reasons these improvements were chosen from the McKinstry report is because they: 1) have the ability to reduce Wolf Ridge's carbon production considerably while improving efficiency, 2) utilize a renewable energy source (solar), and 3) serve as visible demonstrations for educating users on the benefits of energy conservation and efficiency, and renewable energy. Monitoring equipment is important for evaluating the projects and for collecting data for future improvements.

Summary Budget Information for Result/Activity 1:

| | |
|----------------------|-----------|
| ENRTF Budget: | \$234,000 |
| Amount Spent: | \$ 0 |
| Balance: | \$234,000 |

| Deliverable/Outcome | Completion Date | Budget | Estimated Carbon Reduction (#s) |
|--|------------------------|---------------|---|
| 1-1 Install Envelope Improvements in two buildings to conserve energy | 6/30/11 | \$127,881 | 0 (Carbon neutral due to heating only with wood.) ** |
| 1-2 Upgrade the efficiency of Interior Lighting throughout campus | 12/31/10 | \$17,500 | 45,984 |
| 1-3 Convert Refrigeration Units to capture waste heat | 12/31/11 | \$18,714 | 4,960 |

| | | | |
|---|----------|----------|--------|
| 1-2 Install a Solar Hot Water system | 12/31/11 | \$45,237 | 34,607 |
| 1-4 Install a Sub-metering monitoring system | 12/31/10 | \$24,668 | 0 |

** Wolf Ridge heats with a wood/hot water system. Since carbon is stored in wood while growing then released when burned, according to McKinstry's calculations, wood is considered to be a carbon neutral source of heat.

Result Completion Date: *June 31, 2012*

Result Status as of 1/15/2011:

Result Status as of 7/15/2011:

Result Status as of 1/15/2012:

Result Status as of 7/15/2012:

Final Report Summary: 7/15/2012

V. TOTAL ENRTF PROJECT BUDGET:

Contracts: Professional/technical assistance for a design/implementation team \$23,000. The professional contractors will be determined through a competitive bid process.

Supplies: \$0

Capital Improvements:

Conservation: Envelope Improvements \$121,215 (30% equipment, 70% installation)

Efficiency: Lighting upgrades \$17,500 (30% equipment, 70% installation)

Efficiency: Refrigeration upgrades \$15,714 (50% equipment, 50% installation)

Renewable: Solar Hot Water \$36,571 (50% equipment, 50% installation)

Monitoring: metering and sub-metering equipment \$20,000 (40% equipment, 60% installation)

TOTAL ENRTF PROJECT BUDGET: \$234,000

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 MN; Deep Portage, Walker MN; Eagle Bluff, Lanesboro MN; Laurentian, Britt MN; Long Lake, McGregor MN; and Wolf Ridge, Finland MN.

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. Wolf Ridge 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. Wolf Ridge currently uses a 10 KB wind turbine and a 880 watt solar array to provide electricity to one of our education buildings. The ENRTF funds will allow us to expand our renewable energy use by introducing solar thermal technology to the campus, and also significantly increase the energy conservation and efficiency of two of our 22-year old buildings. Wolf Ridge plans to expand it's current real time energy displays from the wind tower to include the new solar thermal array, and share this technology with the other centers. The current real time energy displays can be viewed on our website.

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

| Item | Collective | Wolf Ridge |
|---|-------------|------------|
| C1: 2009 Federal Allocation– 5 Northern Centers, pending | \$1,500,000 | \$300,000 |
| C2: Continue Project Development – Butler Family Foundation | \$30,000 | \$5,000 |
| C3: In-kind Staff | \$30,000 | \$5,000 |
| C4: Fred C. and Catherine B. Andersen Foundation | | \$43,000 |
| <i>In Process of Applying</i> | | |
| 2010 Federal Allocation – all six centers | \$1,800,000 | \$300,000 |

D. Spending History:

| Item | Collective | Wolf Ridge |
|--|------------|------------|
| D1: Bush Foundation – McKinstry Study | \$176,000 | \$29,300 |
| D2: Butler Family Foundation – Project Development | \$30,000 | \$5,000 |
| D3: Heating System Evaluation by McKinstry, Inc. | | \$15,000 |

VII. DISSEMINATION:

Collective: 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. The project will also be discussed in all future New Energy Resource Advisor (ERA) training seminars to be held on-site at each center.

The Energy Resource Advisor (ERA) certificate, developed by Winona State University, is a new curriculum designed to accelerate public understanding of energy efficiency,

clean energy, carbon emissions, resource conservation, green technologies, and green jobs. 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 at one of the six RELCs*. Participants in this class will learn about: a) the basic components of an energy audit, b) small-scale renewable energy including site suitability, system sizing, and financial incentives that are available, c) alternative building and transportation options, d) ways to “green up” the home or business, and e) the field of emerging “green” jobs. After completing this course, the successful participant may serve as an energy resource advisor and “green” consultant in the community and workplace.

Wolf Ridge –Wolf Ridge will include project information on our website, in our newsletter, and through articles/press releases in local paper and electronic media. As stated earlier, we will also incorporate these efficiency and renewable energy applications into our two climate change lesson plans that educate our users about energy conservation and renewable energy options applicable to their home, communities, and schools. Wolf Ridge will also develop an “Energy Challenge” for our participants that have them conduct their own energy audit of the campus and their behaviors while they are here for three to five days, incorporating the ENRTF funded projects. This is still in the brainstorming phase, but should be easy to do as all our schools currently do a “Conservation Challenge” where they earn points for turning off the lights, recycling, conserving water, etc.

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: 075-B3 Demonstrating Sustainable Energy Practices at Residential Learning Centers (RELCs) 7d-6 Wolf Ridge Environmental Learning Center

Project Manager Name: Kimberly Skylander

Trust Fund Appropriation: \$1,500,000

| 2010 Trust Fund Budget | <u>Result 1 Budget:</u> | Amount Spent (date) | Balance (date) | TOTAL BUDGET | TOTAL BALANCE |
|---|---|--------------------------------|---------------------------|-------------------------|----------------------|
| | Implementation of carbon and energy reduction systems for education and demonstration purposes. | | | | |
| BUDGET ITEM | | | | | |
| Contracts | | | | | |
| Professional/technical- for designing/building the capital projects (contractor will be determined through competitive process) | 23,000 | 0 | 23,000 | 23,000 | 23,000 |
| Capital equipment over \$3,500 | | | | | |
| Conservation- Envelope Improvements--30% equipment, 70% installation | 121,215 | 0 | 121,215 | 121,215 | 121,215 |
| Efficiency-Interior Lighting-30% equipment, 70% installation | 17,500 | 0 | 17,500 | 17,500 | 17,500 |
| Efficiency-Refrigeration Conversion-50% equipment, 50% installation | 15,714 | 0 | 15,714 | 15,714 | 15,714 |
| Renewable- Solar Hot Water -50% equipment, 50% installation | 36,571 | 0 | 36,571 | 36,571 | 36,571 |
| Monitoring - Submetering, 40% equipment, 60% installation | 20,000 | 0 | 20,000 | 20,000 | 20,000 |
| | | | | | |
| COLUMN TOTAL | \$234,000 | \$0 | \$234,000 | \$234,000 | \$234,000 |