2010 Project Abstract
For the Period Ending June 30, 2012

PROJECT TITLE: Demonstrating Sustainable Energy Practices at Residential Environmental Learning Centers (RELCs)—Deep Portage Learning Center (7d-3)
PROJECT MANAGER: Dale Yerger, Director of Deep Portage Learning Center
AFFILIATION: Deep Portage Learning Center - MN Coalition of RELCs
MAILING ADDRESS: 2197 Nature Center Drive NW
CITY/STATE/ZIP: Hackensack, MN 56452
PHONE: 218-682-2325
E-MAIL: portage@uslink.net
WEBSITE: www.deep-portage.org
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: MN Laws 2010, Chapter 362, Sect 2, Sub 7d-3

APPROPRIATION AMOUNT: $212,000

Overall Project Outcome and Results

Cass County, MN has installed a small wind turbine and solar hot water system and has made electrical and envelope improvements to the environmental education facility known as Deep Portage Learning Center. A $212,000 grant from the Environment and Natural Resources Trust Fund has made this possible. All of these systems have been installed, and we now have a year's worth of energy savings data. The 10 Kw small wind turbine has produced 4,200 Kw hours of electricity and has eliminated the emission of 10,080m lbs. of carbon dioxide. The solar hot water system has produced thousands of gallons of domestic hot water and displaced 1,400 gallons of fossil fuel propane. New LED (light-emitting diodes) lights, E Solutions refrigeration equipment and new Energy Star windows round out the project. These technologies are for demonstration and education. A new sustainable energy curriculum has been developed and piloted with several Minnesota schools. Five-hundred-plus people have now gone on a renewable energy tour at the center. This project shows our residents how to reduce our carbon footprint, save money. and support local jobs and industry. The electrical use at the Deep Portage Learning Center is now an astonishing 2.2 Kw hours per square foot annually. The Carbon footprint has been cut in half, and the total energy savings is $15,000-20,000 per year. This is a model that can be repeated at public schools and government buildings around the State.

Project Results Use and Dissemination

Information about this project will be disseminated in our center's newsletters, website and blogs, emails, and annual reports. It will also be discussed in all future New ERA training seminars 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.

Deep Portage Learning Center – Deep Portage has had over 200 participants attend renewable energy tours and has taught classes to elementary students in renewable energy. We have posted data on our Facebook page, and our website has a renewable energy toolbar with data on the accomplishments of the initiative. The TLFAST and LCCMR websites also feature information.

Final Report Progress

The collective website is up and running, www.tlfast.org/dplc.html . The six centers have collaboratively developed 22 units of curriculum for use by each center. These curricula integrate the use of the demonstrated sustainable energy practices at each of the centers. These lessons were pilot tested in all six centers this past spring, adjustments made over the summer, and are now all available for groups.

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

Date of Report: Final Report 7/30/2012
Date of Next Progress Report: Final Report
Date of Work Program Approval:
Project Completion Date: 6/30/2012

I. PROJECT TITLE: Demonstrating Sustainable Energy Practices at Residential Environmental Learning Centers (RELCs)—Deep Portage Learning Center (7d-3)

Project Manager: Dale Yerger, Director of Deep Portage Learning Center
Affiliation: Deep Portage Learning Center - MN Coalition of RELCs
Mailing Address: 2197 Nature Center Drive NW
City / State / Zip: Hackensack, MN 56452
Telephone Number: 218-682-2325
E-mail Address: portage@uslink.net
Fax Number: 218-682-3121
Web Site Address: www deep-portage.org

Location: City of Hackensack in Cass County, MN

Total ENRTF Project Budget:	**ENRTF Appropriation**	**$212,000**
	Minus Amount Spent:	**$212,000**
	Equal Balance:	**$0**

Legal Citation: M.L. 2010, Chp. 362, Sec. 2, Subd. 7d3

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; $223,289 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 and III. FINAL PROJECT SUMMARY:
Cass County MN has installed a small wind turbine and solar hot water system and has made electrical and envelope improvements to the Environmental Education facility known as Deep Portage Learning Center. A $212,000 grant from the Environment and Natural Resources Trust Fund has made this possible. All of these systems have been installed, and we now have a year's worth of energy savings data. The 10 Kw small wind turbine has produced 4200 Kw hours of electricity and has eliminated the emission of 10,080m lbs. of carbon dioxide. The solar hot water system has produced thousands of gallons of domestic hot water and displaced 1400 gallons of fossil fuel propane. New LED (light-emitting diodes) lights, E Solutions refrigeration equipment and new Energy Star windows round out the project. These technologies are for demonstration

and education. A new sustainable energy curriculum has been developed and piloted with several Minnesota schools. Five-hundred-plus people have now gone on a renewable energy tour at the center. This project shows our residents how to reduce our carbon footprint, save money and support local jobs and industry. The electrical use at the Deep Portage Learning Center is now an astonishing 2.2 Kw hours per square foot annually. The Carbon footprint has been cut in half, and the total energy savings is $15,000-20,000per year. This is a model that can be repeated at public schools and government buildings around the State.

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT 1/ACTIVITY 1. Implementation of carbon and energy reduction systems for education and demonstration purposes at Deep Portage Learning Center (DPLC). Budget $212,000. Completion Date June 30, 2012.

Description: DPLC is located in Cass County, Minnesota. We serve 10-20,000 participants annually—from Minnesota and Iowa, and a small percentage of international groups. Our campus encompasses approximately 60,000 square feet. Our focus is environmental literacy for all ages.

The McKinstry report recommended a number of items that would improve the efficiency of our campus. In April 2008 when our summary was presented we were using 30,000 gallons of propane per year (that's 378,000 lbs of carbon per year). The McKinstry report recommended the following priorities:

- Improve building envelope performance
- Add lighting controls to existing fixtures
- Convert domestic hot water with additional solar heating and instantaneous electric back up
- Upgrade existing temperature controls.

Since the McKinstry report, DPLC has already implemented some carbon reducing modifications using other funds. Instead of upgrading the temperature controls we took an alternative approach and added a wood gasification energy system to our facility in October 2009.

With these ENRTF funds we will continue to implement carbon cutting measures at DPLC by focusing on the following four McKinstry recommendations:

1. Installing a 900 gallon per day solar hot water system
2. Envelope improvements to the main lodge and the interpretive center
3. Small wind project to offset Kw hour usage
4. Electrical Improvements

We have chosen these 4 recommendations based on their ability to reduce carbon and demonstrate alternative energy.

Solar Hot Water. We use 900 gallons of hot water per day, a solar hot water system would reduce our reliance on propane and electricity. We plan to install an engineered system that will supply us with our hot water needs, which is especially efficient during the summer months when our wood system is not in use.

Envelope improvements. The windows and doors in our 54,000 square foot facility are between 10 and 24 years old, they leak a lot of heat and have significant gaps. We plan to replace the oldest windows and doors first.

Small Wind. We plan to install a 10 K wind turbine on a 130 foot high lattice tower help to offset the 232,000 Kw hours that we currently use each year.

Electrical Improvements. McKinstry recommended lighting upgrades to reduce Kw hours usage. We plan to change out lighting fixtures, switches, and refrigeration and freezer compressors.

The Goal of the McKinstry study was to increase building health and efficiency thereby reducing the carbon footprint of our facility. Our plan will achieve to following goals:

1. reduce carbon
2. decrease operating expense
3. demonstrate alternative energy and conservation
4. generally show that an older building can be upgraded to have near LEED certification efficiency, most of us will improve our existing structure if there are technologies available to lower costs and save energy.

In summary, we are reducing propane and Kw hours, these two sources of carbon usage represent the low hanging fruit of carbon reduction . These improvements will be at the heart of our alternative energy demonstration and education program. Through the implementation of envelope improvements, mechanical improvements, and photovoltaic demonstration at DPLC, this project is expected to reduce carbon output by 76,883 lbs per year.

Estimated Carbon Reduction: The ENTRF project will reduce 76,883lbs. of CO2.

Summary Budget Information for Result 1:

ENRTF Budget:	**$212,000**
Amount Spent:	**$212,000**
Balance:	**$0**

Deliverable/Outcome	Completion Date	Budget	Estimated Carbon Reduction (#s)
1-1 Solar Hot Water	9/30/2011	$86,976	8,883 lbs.
1-2 Envelope & Electrical Improvements	9/30/2011	$39,322	32,000 lbs
1-3 Small Wind	9/30/2011	$75,991	36,000 lbs
1-4 Professional/Technical Contracts	9/30/2011	$21,000	0 lbs.

Result Completion Date: June 30, 2012

Final Report Summary:

The Cass County Board as of January 4, 2011 approved bids for 1-1, 1-2, 1-3, and 1-4. This project was delayed due to design time for the solar hot water system and value

engineering, as the first set of bids were all significantly over budget. Also CAM was not prompt with the management of the project. Additionally, the winter was especially cold and snowy and not contusive to certain kinds of construction. On January 31 we had our onsite meeting with the four successful contractors and planned for work to take place in February and March, as well as in the spring when the ground would be thawed and foundations for the wind turbine and solar hot water could be excavated.

As of July 15, 2011, **1-1** was 90% complete; electrical and insulation work remained, and manufacturer start-up was expected to occur within the following two weeks. **1-2** was complete; 400-wing windows, walk-in cooler components, and dining hall and public bathroom lighting upgrades were complete. 200-wing windows and walk-in freezer component upgrades were moved to the Department of Energy grant and were also complete. **1-3**: The 10 Kw wind turbine was erected and had thus far produced 150 Kw hours of electricity. There had been dozens of visitors to the site for tours so far that summer, and the young women's science camp studied the installation and collected data. **1-4:** We had achieved many of our design and engineering objectives, including value engineering and were moving forward on this project forward to meet the completion date. Because alternative energy projects and contractors are still not that widespread, there were budget and design challenges with this project that led to the amendments. However we stayed on track to get the job done with the objective of adding significant educational and demonstration capabilities to our campus.

As of January 15, 2012: The solar hot water system had saved 1,400 gallons of propane and 17,640 lbs. of CO2. The electrical and mechanical improvements had reduced our electric bill by 5% and reduced our carbon output by 9,750 Kw hours of electricity and 23,400 lbs of CO2. The wind turbine had produced 2450 Kw hours, reducing 5880 pounds of CO2.

As of June 30, 2012 all projects were complete and all contractors paid. The total of all deliverable/outcomes was $223,289; this is $11,289 more than the allocation, and the extra funds came from the Deep Portage Foundation. Issues with the solar hot water were resolved by reprogramming the controller; the system has not overheated this summer. We have had about 325 people take part in renewable energy tours this past year, and we have also taught a number of sustainable energy units to elementary school students. We have posted data on our website and Facebook page. There has been a lot of interest and buzz around these projects with lots of visitors enjoying the comfort of the buildings in winter and the excitement of solar and wind energy. Including the Federal matching projects, we have now produced 14,000 Kw hours of electricity on site. Our 2011 electric bill was 13% lower than 2010. Our kw hour per square foot annually is an astounding 2.5 kw hours per square foot. This is practically unheard of in a school (anything below 10 kw hours per square foot is energy star). Our propane reduction this year is 90%; 1,400 gallons of propane are reduced each summer by the solar hot water system. We are using locally sourced fuels and helping to sustain and create local jobs. Deep Portage Learning Center has become a model for the state and the nation.

V. TOTAL ENRTF PROJECT BUDGET:

Contracts: $21,000. These funds will pay for the design and engineering work, including writing the bid specs and creating the RFP for the competitive bid process.
Supplies: $0
Capital Improvements: $202,289
Solar Hot Water – $86,976 - 50% equipment, 50% installation
Envelope & Electrical Improvements - $39,322 - 50% equipment, 50% installation
Small Wind - $75,991 - 80% equipment, 20% installation
TOTAL ENRTF PROJECT BUDGET: $212,000

Explanation of Capital Expenditures Greater Than $3,500: The capital improvements indicated above that are made with these funds are fixed capital assets and will remain in place and will continue to be used for the same program throughout 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: We started the carbon reduction process with the aforemetioned 2009 Deep Portage/DEED Project. The ENRTF project will be the second step. We have an overall campus goal of carbon reduction and energy efficency that is expected to cost $1,000,000 ($6 million for the total partnership). Deep Portage will continue to work with our five other partners to implement educational programs and achieve our goal of modeling efficiency and carbon reduction.

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

Item	Overall RELC Project	Deep Portage Learning Center
C1: In-kind services RELC staff	$30,000	$5000
C2: Continued Project Development, Butler Family Fund	$30,000	$5000
C3: Federal Allocation	$1,500,000	$300,000
C4: Deep Portage Foundation Gift		$11,209

D. Spending History:

Item	Overall RELC Project	Deep Portage Learning Center
Bush Foundation – McKinstry Study	$176,000	$29,300
Butler Family Foundation – Project Development	$30,000	$5,000
Deep Portage Foundation / MN DEED project		$305,000

VII. DISSEMINATION: Information about this project will be disseminated in our center's newsletters, website and blogs ,emails, and annual reports. It will also be discussed in all future New ERA training seminars held on-site at each center.

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VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than 01/15/2011, 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 ENTRF.

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-3 Deep Portage Learning Center							
Project Manager Name: Dale Yerger							
Trust Fund Appropriation $212,000 *							
2010 Trust Fund Budget	**Revised Result 1 Budget**	**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: These funds will pay for the design and engineering work, including writer the bid specs and creating the RFP for the competitive bid process for Solar Hot Water, Envelope & Mechanical and Photovoltaic Demonstration	21,000	21,000	0	21,000	0		
Capital equipment over $3,500							
Solar Hot Water--50% equipment, 50% installation	80,000	80,000	0	80,000	0		
Envelope & Mechanical Improvements--50% equipment, 50% installation	39,000	39,000	0	39,000	0		
Small Wind	72,000	72,000	0	72,000	0		
COLUMN TOTAL	**$212,000**	**$212,000**	**$0**	**$212,000**	**$0**		
NOTE: The actual cost and the checks that Cass County issued total $223,289. The difference--$11,289--was issued to Cass County by the Deep Portage Foundation (the entity that has a contract to operate at the Deep Portage Learning Center).