

STATEMENT OF PROJECT OBJECTIVES

Northwoods Audubon Center, Inc.
CDP 265.10 Today's Leaders for a Sustainable Tomorrow

A. PROJECT OBJECTIVES

Northern Minnesota's five Residential Environmental Learning Centers the Audubon Center of the North Woods, Deep Portage Learning Center, Laurentian Environmental Center, Long Lake Conservation Center and Wolf Ridge Environmental Learning Center came together in 2007 to form the coalition *Today's Leaders for a Sustainable Tomorrow* to reduce carbon output at each campus and be models of energy efficiency and responsibility through demonstration and education. Supported by the Bush and Butler Foundations, the coalition chose to invest in a professional energy audit at each campus in 2008 utilizing the engineering and consulting firm McKinstry, Inc. McKinstry's study is the basis for our collective energy investment and education development work tasks. Our goal for this project is to use site appropriate methods of energy conservation, efficiency and renewable technologies to lower our energy consumption and impact, therefore becoming more environmentally responsible and being models for others to learn from. We hope to be leaders for the state on responsible energy usage and promote the technologies to our participants through formal and informal education.

B. PROJECT SCOPE

Today's Leaders for a Sustainable Tomorrow is in the Buildings and Technologies Division of Department of Energy programs. The five centers (Audubon Center of the North Woods, Deep Portage Learning Center, Laurentian Environmental Center, Long Lake Conservation Center and Wolf Ridge Environmental Learning Center) will be increasing energy efficiency, energy conservation and renewable energy technologies through a number of different means appropriate for each unique center. For energy efficiency upgrades the centers will install envelope improvements to seal air barriers through better insulation in walls, ceilings, windows, doors as well as the installation of more energy efficient windows, doors, lighting and air ventilation systems. Through energy sub-meter monitoring the centers will be able to accurately chart the usage of energy at each of their campuses and eliminate unnecessary energy usage. Facilities will reduce their dependence on fossil fuel energy sources through the installation of renewable energy technologies including wood gasification, solar domestic hot water, solar photovoltaic, geothermal heating, outside-air refrigeration and wind power. Centers will also install energy education displays on the specific renewable energy technologies used at the center.

C. TASKS TO BE PERFORMED

Task 1.0 Audubon Center of the North Woods

- 1.1 Install Solar Domestic Hot Water and on-demand instantaneous hot water systems at Dining Hall, Crosby Dormitory, Barn, Staff House, Lowry Lodge, Schwyzer Lodge **COMPLETE**
- 1.2 Envelope Improvements consisting of the installation of improved insulation in ceilings/attics, weather stripping of doors and windows, high efficiency windows/doors, reestablishing continuous air barrier in walls/ceilings and crawl

spaces and replacement of a roof at Barn, Schwyzler Lodge, Lowry Lodge, Crosby Dormitory and Dining Hall **COMPLETE**

1.3 Professional and Technical Engineering for pre-design, design and construction management of envelope improvements, solar hot water and instantaneous on-demand hot water systems **COMPLETE**

1.4 Geothermal Heating Upgrade at Dining Hall **COMPLETE**

1.5 Install Energy Sub-Metering Monitoring equipment and sensors on buildings to lower energy usage **COMPLETE**

1.6 Passive Solar and Solar Air Heat for the Barn **COMPLETE**

1.7 Contract with vendor to Design and Install flat- two dimensional Domestic Solar Hot Water and Geothermal Energy Education Displays to be mounted outside in the ground next to each technology **COMPLETE**

1.8 Professional and Technical Engineering for pre-design, design and construction management of solar photovoltaic system for Dining Hall and Crosby Dormitory **COMPLETE**

1.9 Installation of solar photovoltaic system for Dining Hall and Crosby Dormitory **COMPLETE**

Task 2.0 Deep Portage Learning Center

2.1 Installed Wood Gasification System through MN DEED share. Was bid and constructed in November 2009 **COMPLETE**

2.2 Professional and Technical Engineering to produce drawings, request for proposals, bid specifications, installation engineering and supervision of projects **COMPLETE**

2.3 Installation of 5000 gallons of hot water storage for Energy Building # 3 **COMPLETE**

2.4 Install Solar Domestic Hot Water System for Main Lodge **COMPLETE**

2.5 Install Solar Photo Voltaic System for Main Lodge **COMPLETE**

2.6 Envelope improvements, energy efficient windows and doors to the main lodge building and Electrical improvements to lighting and refrigeration equipment(walk in coolers and freezers) also in the Main Lodge **COMPLETE**

2.7 Installation of 10 KWH wind turbine with data that will tie into Main Lodge Wind Energy Education display. **COMPLETE**

2.8 Design and Install flat, two-dimensional Energy Education Displays in the Main Lodge for Solar, Wind, Wood Gasification Energies and Envelope Improvements that will be contracted with an organization who will design and install the displays **COMPLETE**

Task 3.0 Laurentian Environmental Center

3.1 Replaced and insulated the Main Lodge roof. Completed Nov. 20, 2009 **COMPLETE**

3.2 Pre-design, Design and Construction Management of project work **COMPLETE**

3.3 Install Envelope Improvements consisting of the installation of high efficiency windows and doors, and improved insulation in the walls in Lodge and Office **COMPLETE**

- 3.4 Design and Install Solar Domestic Hot Water System in Main Lodge
COMPLETE
- 3.5 Install an Energy Sub-Metering Monitoring System at all campus buildings.
Gathers baseline data and monitors improvements **COMPLETE**
- 3.6 Lodge and Office Crawl Space and Floor Insulation improvements **COMPLETE**
- 3.7 Install Envelope Improvements in Guest Cabins (Aspen, Evergreen and Fir)
consisting of installation of high efficiency windows and doors and improved crawl space and wall insulation and classrooms (Loon, Walleye, Meyer and Osprey) consisting of installation of high efficiency windows and doors and reestablish continuous air barrier between ceilings and roofs **COMPLETE**

Task 4.0 Long Lake Conservation Center

- 4.1 Install High Energy Efficient Windows and Doors into 5 campus buildings- School House, Lakeside Lab, Administration Building, Dining Hall, and North Star Lodge **COMPLETE**
- 4.2 Install Improved Insulation and Weather Sealing to 5 campus buildings- School House, Lakeside Lab, Administration Building, Dining Hall, and North Star Lodge **COMPLETE**
- 4.3 Long Lake Conservation Center Maintenance worker helping with installation of windows, doors, improved insulation and weather stripping in buildings
COMPLETE
- 4.4 Design and Install Solar Domestic Hot Water System in Dining Hall and two dormitories located on campus **COMPLETE**
- 4.5 Design and Convert Make-Up Air Systems in Dining Hall to hot water from propane **COMPLETE**
- 4.6 Convert and Install Campus Lighting from sodium halite fixtures to solar powered LED lights **COMPLETE**
- 4.7 Install Sub-Metering/Monitoring Equipment to track and record data on energy efficiency/renewable energy upgrades **COMPLETE**
- 4.8 Contract with vendor to Design and Install two-dimensional energy education displays/kiosks in classrooms for solar hot water, solar lighting, and energy efficient buildings **COMPLETE**

Task 5.0 Wolf Ridge Environmental Learning Center

- 5.1 Installing Envelope Improvements of weather sealing windows, replacement with high efficiency outer doors, added insulation in ceiling/attic and reestablishing continuous air barrier in walls, floors and crawl spaces in Dining Hall and East Dormitory for energy conservation **COMPLETE**
- 5.2 Upgrade the Efficiency of Campus-Wide Lighting **COMPLETE**
- 5.3 Convert Refrigeration Units to capture waste heat **COMPLETE**
- 5.4 Design and Install Solar Hot Water System in the West Dormitory building
COMPLETE
- 5.5 Install a Sub-Metering Monitoring System at all campus buildings. Gathers baseline data and monitors improvements **COMPLETE**
- 5.6 Design and Install 3 high efficiency Wood Gasification Units and thermal storage
COMPLETE

5.7 Wolf Ridge Environmental Learning Center Energy Center Supervisor and Maintenance Assistant working to install Wood Gasification Units **COMPLETE**

Task 6.0 Project Management and Reporting

6.1 Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting Checklist following the instructions included therein.
COMPLETE

Final Technical Report from 09/30/12-12/29/12

Audubon Center of the North Woods:

Federal Share Spent: \$37,226.99 for Envelope Improvements
\$6,900 for solar photovoltaic design
\$5,000 Geothermal Heating Software Upgrade
\$22,319.09 Energy Monitoring/Metering/Efficiency
\$59,743.84 for solar hot water project
\$13,850 for passive solar and solar air heat
\$144,419 for solar photovoltaic system
\$8,392 Geothermal Upgrade
\$3,860 Educational Displays
\$301,710.92 Total

Cost-Share Spent: \$24,483 for Pre-Design Architecture and Engineering
\$116,517 for envelope improvements
\$65,000 for solar hot water project
\$15,000 lighting upgrade
\$45,000 envelope improvements
\$266,000 Total

Deep Portage Learning Center:

Federal Share Spent: \$91,700 for envelope improvements
\$88,082.60 for solar photovoltaics
\$38,000 for wood gasification
\$85,000 electrical improvements
\$302,782.60 Total

Cost-Share Spent: \$306,000 for wood gasification (DEED Grant)
\$86,976 for solar hot water system
\$21,847 for electrical upgrades
\$18,000 for envelope improvements
\$75,991.88 for wind turbine
\$21,000 for engineering and construction management
\$529,814.88 Total

Laurentian Environmental Center:

Federal Share Spent: \$5,500.00 ó Energy Audit
\$18,289.98 ó Architecture and Engineering
\$276,210.02 for Envelope Improvements in Aspen, Evergreen, Fir, Meyer, Birch, Cedar, Dogwood and Osprey buildings
\$300,000 *Total*

Cost-Share Spent: \$64,505.70 for Solar-Hot Water
\$5,220 for new exterior doors
\$13,669 for Pre-Design Architecture and Engineering
\$44,702 for replacing and insulating roof on the Lodge building
\$158,500 for Envelope Improvements in the Office and Lodge
\$222,826 *Cost Share Total*

Long Lake Conservation Center:

Federal Share Spent: \$295,506.48

- \$180,000.00 ó For high energy efficient windows and doors installed into 5 different buildings.
- \$115,506.48 ó Installed and applied improved insulation and weather sealing to 5 different buildings

Cost-Share Spent: \$243,860

- \$3,860.00 ó Use of Maintenance Coordinator for 242 hours of labor to assist with installation of solar LED Lighting
- \$128,000- For professional/technical services on design. Payments towards installation of solar thermal and solar PV installations
- \$54,000 - Design and convert make-up air system in Dining Hall to hot water from propane
- \$32,000 - Convert and install campus lighting from sodium halite fixtures to solar powered LED lights
- \$26,000 - Install Sub-Metering/Monitoring equipment to track and record data on energy efficiency/renewable energy upgrades

Wolf Ridge Environmental Learning Center:

Federal Share Spent:

\$300,000.00 *Total*: for biomass boiler installation, expansion tank, reserve tank, exhaust, pumps and plumbing.

Cost Share Total Spent: \$387,402.27

LCCMR:

\$39,735 Conservation ó building envelope improvements
\$59,096 Efficiency ó LED outdoor lighting installation

\$77,768 Renewable ó solar domestic hot water installation

\$57,401 Monitoring ó sub-metering

\$234,000 Sub-Total

Wolf Ridge:

\$5,294.98 Wages & benefits for boiler project

\$16,275.89 Pellet bin

\$131,131.40 ABE Environmental biomass boiler installation

\$700.00 Computer control for biomass boilers

\$153,402.27 Sub-Total