

**Environment and Natural Resources Trust Fund
2010 Request for Proposals (RFP)**

LCCMR ID: 065-B2

Project Title:

Residential-Scale Solar Thermal Systems for Low-Income Heating

LCCMR 2010 Funding Priority:

B. Renewable Energy Related to Climate Change

Total Project Budget: \$ \$615,500

Proposed Project Time Period for the Funding Requested: 3 years, 2010 - 2013

Other Non-State Funds: \$ \$250,000

Summary:

The Rural Renewable Energy Alliance will protect Minnesotas environmental legacy, reducing energy use by 154,000kWh annually while creating local green jobs through 75 solar heating system installations.

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Sponsoring Organization: Rural Renewable Energy Alliance

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Web Address: www.rreal.org

Location:

Region: Regional

County Name: Statewide

City / Township:

_____ Knowledge Base	_____ Broad App.	_____ Innovation
_____ Leverage	_____ Outcomes	
_____ Partnerships	_____ Urgency	_____ TOTAL

I. PROJECT STATEMENT

The Rural Renewable Energy Alliance will work with collaborators to help protect and promote Minnesota habitat, native species, air and water quality through the reduction of harmful environmental contaminants. This will be accomplished by reducing energy use and emissions resulting from the most significant source of annual Minnesota residential energy consumption: space heating. 75 Solar Air Heating systems will be installed on the recently weatherized homes of low-income families during this project, resulting in a total of up to 289,986 pounds carbon dioxide, 1,848 pounds sulfur dioxide, and 1.20e-2 pounds mercury emissions reductions *each year*.

Solar Air heat is an innovative technology, with demonstrated effectiveness, readily deployed in retrofit applications. Of all the solar technologies, solar air heat has among the highest coefficient of performance while requiring the least investment, thus achieving the fastest payback. Solar Air heat has broad applicability on a nationwide basis with Minnesota currently setting the standard by incorporating renewable energy into the weatherization program. Solar collectors utilized during this project will be manufactured locally in Minnesota, and this project will support the creation of green jobs through the manufacturing facility and installations. Carbon and other greenhouse gas emissions from residential consumers will be reduced; community-based, locally-produced, innovative clean energy technologies will be adopted and understood; and the applicability and effective implementation of solar thermal technologies in Minnesota will be further evaluated.

Goals of this project include:

- Protection of Minnesota's Natural Resources through the use of clean energy;
- Reduction of carbon and other greenhouse gas emissions;
- Reduction in fossil fuel based energy consumption;
- Increase in national security through localized energy production;
- Creation of local green jobs;

Impacts include:

- Air and water quality improved and reduction of environmental contaminants for the benefit of all Minnesota inhabitants;
- Low-income Minnesota families served;
- Permanent solution addressing fuel poverty introduced.

II. DESCRIPTION OF PROJECT RESULTS

Please note that project efforts will occur concurrently.

Result 1: Select Potential System Recipients.

Budget: \$15,000 **Completion Date:** 07/1/2011

Deliverable: A. Two hundred Potential System Recipients identified in collaboration with Community Action agencies.

Result 2. Conduct site analyses of 200 homes.

Budget: \$31,000 **Completion Date:** 09/30/2011

Deliverable: A. Site analyses conducted on 200 homes.
B. Seventy-five homes selected, system designs tailored for each.

Result 3: Order parts and manufacture collectors.

Budget: \$300,000 **Completion Date:** 11/30/2011

Deliverable: A. Parts ordered and collectors manufactured.
B. Creation of local green jobs.

Result 4: Install solar air heating systems on selected households.

Budget: \$181,750 **Completion Date:** 12/31/2011

Deliverable: A. Solar air heating systems installed on 75 households.
B. Reduction in carbon and other greenhouse gas emissions.

- C. Reduction in fossil-fuel based energy consumption.
- D. Creation of local green jobs.

Result 5: Random selection of 25 households for data collection.

Budget: \$7,000 **Completion Date:** 05/01/2012

- Deliverable:**
- A. Random selection methodology will be established.
 - B. Twenty-five households will be randomly selected for data collection.

Result 6: Conduct interviews and collect data.

Budget: \$50,750 **Completion Date:** 01/01/2013

- Deliverable:**
- A. Qualitative interviews will be conducted with project participants to determine overall satisfaction with system and understanding of operation.
 - B. Data loggers will be deployed and system performance data will be collected.

Result 7: Assemble all data, post results on website, and report to LCCMR.

Budget: \$20,000 **Completion Date:** 5/01/2013

- Deliverable:**
- A. Overall impact will be calculated, both quantitative and qualitative impacts.
 - B. Arrange analysis results and disseminate.

Result 8: Track expenditures and activities.

Budget: \$10,000 **Completion Date:** 06/01/2013

- Deliverable:**
- A. Report expenditures and activities to LCCMR.
 - B. Report findings on website and to LCCMR.

III. PROJECT STRATEGY

A. Project Team/Partners

The Rural Renewable Energy Alliance will work with Community Action agencies throughout Minnesota in establishing potential system recipients. Site analyses will be conducted through qualified Community Action agencies and the Rural Renewable Energy Alliance staff. System designs will be completed by engineers and technicians at the Rural Renewable Energy Alliance, and parts will subsequently be ordered from or manufactured at the facility in Pine River, Cass County. Collectors are currently being deployed with a certification pending status, granted through the Department of Labor and Industry. Solar heating systems installations will be headed by the Rural Renewable Energy Alliance, MN Residential Building Contractor License #20629837. Random selection of participant households and qualitative interviews will be conducted through collaboration with an independent third party, such as a local University. Data will be collected by Rural Renewable Energy Alliance staff, with impact and analysis overseen by an independent third party. Expenditures and activities will be tracked by the Operations Manager.

B. Timeline Requirements

In order to provide winter heating season data for the 25 randomly selected solar air heating installations (out of 75), they will be evaluated over the total of one heating season.

C. Long-Term Strategy

The long-term strategy of the Rural Renewable Energy Alliance is to introduce the incorporation of solar energy into the energy assistance program nationwide. Minnesota is leading the charge on this front, and has already received international recognition and a national award for its inclusion of solar heat in the energy assistance program, in part due to our organizations' efforts. The Rural Renewable Energy Alliance's plan is to assist weatherization providers across the country over the coming years in supplying their low-income clients with solar power.

Other long-term funding strategies employed to support our mission include:

- A. Fundraising through grantwriting;
- B. Private donor program development;
- C. Revenue through program service delivery;
- D. Earnings through sales of manufactured solar collectors to the general public.

Project Budget

IV. TOTAL PROJECT REQUEST BUDGET (3 years)

<u>BUDGET ITEM</u> (See list of Eligible & Non-Eligible Costs, p. 13)	<u>AMOUNT</u>
Personnel:	
Site Analysis Crew, 40% full-time, 80% toward salary, 20% toward benefit, 7/2010 to 9/2011, 1 person. 200 Site visits @ \$100.ea (5 hours @ \$20/hr per site visit).	\$ 20,000
Installation Crew, 35% full-time, 80% toward salary, 20% toward benefits, 7/2010 to 12/2011, 3 people in position. Ea. installation averages \$1500.	\$ 112,500
Analysis/Data Collection Team, 30% full-time, 85% toward salary, 15% toward benefits, 1/2011 to 5/2013, 2 people. Data collection @ \$1,000/system; Assembly of data @ 570 hours @ \$35/hr.	\$ 45,000
Bookkeeper/Assistant, 7.5% full-time, 85% toward salary, 15% toward benefit, 7/2010 to 6/2013, 1 person in position, 3 hrs/wk average @ \$21/hr.	\$ 10,000
Contracts:	
Community Action agencies - compensation for time spent on potential system recipient selection and site analyses.	15,000
Local electricians - will be procured for simple wiring of controls on each system installation, including the fan, snap disc, and thermostat.	\$ 33,750
Third-party Random selection of households to be analyzed.	\$ 7,000
Third-party Interviews.	\$ 12,500
Equipment/Tools/Supplies:	
Solar collectors (includes cost of labor for assembly)	\$ 175,000
Data loggers for post-installation data collection and analysis	\$ 5,000
Installation Supplies - Remaining parts necessary to complete installations, including ductwork, fans, fasteners, racking, backdraft dampers, etc. (cost @ \$1310/installation)	\$ 125,000
Travel:	
Mileage - Site Analysis Crew - 200 visits, average 100 miles round-trip by dovetailing visits together, @ \$0.55/mile	\$ 11,000
Mileage - Installation Crew - 75 Installations, average 300 miles round-trip @ \$0.55/mile	\$ 13,000
Mileage - Data collection Crew - 25 sites visited twice, average 300 miles round-trip @ \$0.55/mile	\$ 8,250
Hotel for installation crew (installations completed in 2 days - one night stay for each installation, 2 rooms @ \$100 ea.)	\$ 15,000
Additional Expenses: Installation Inspection & Permitting Fees	\$ 7,500
TOTAL PROJECT BUDGET REQUEST TO LCCMR	\$ 615,500

V. OTHER FUNDS

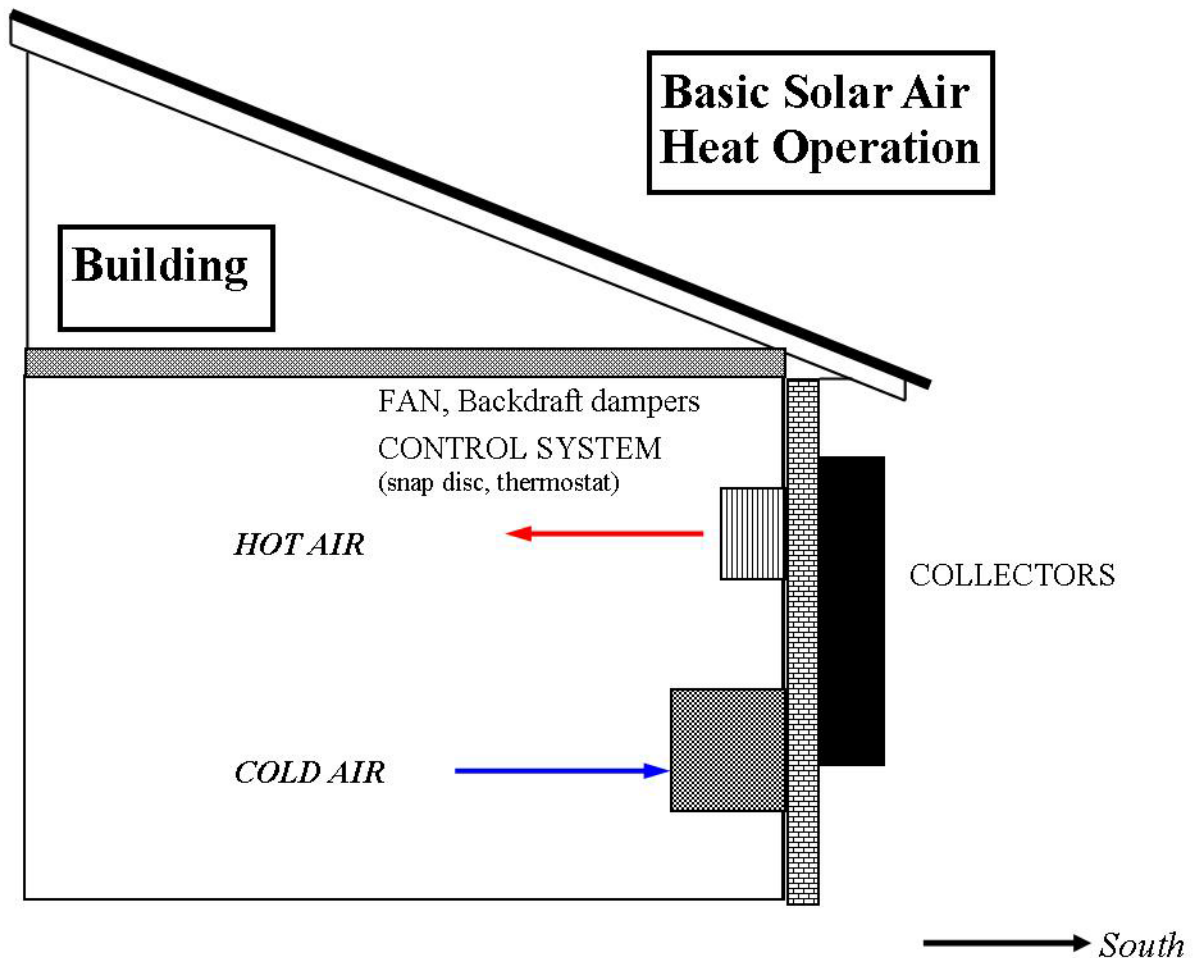
<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ Being Applied to Project During Project Period: USDA grant applied for.	\$ 250,000	<i>Pending</i>
Other State \$ Being Applied to Project During Project Period: None for this particular project.	\$ -	
In-kind Services During Project Period: In-kind Rent, manufacturing facility.	\$ 36,000	<i>Secured</i>

Overview of the System

Supplemental Solar Air Heating Systems provide supplemental space heat to a residence or out-building. A system will typically provide 15-25% of a building's annual space heating needs, amounting to a significant quantity of energy in cold northern winters over the long life of the system.

Essentially, solar air heat collectors are air-to-air heat exchangers. The collectors (4'X6-1/2', 4'X8', or 4'X10') are mounted vertically on the south-facing exterior wall, and when the temperature inside of the collectors gets high enough (110°F), the fan is activated. When the fan is activated, air is circulated through the collectors, gradually warming the air in the building.

The solar air heat system operation is designed to be fully automatic. There are two system controls: a thermostat and a snap disc switch. So, the system will only be activated if both A) the collectors are warm enough to deliver heat, and B) the thermostat in the building is calling for additional heat. In order to keep the system properly functioning, keep the solar thermostat set higher than the back-up heating system.



PROJECT LEADER QUALIFICATIONS

Jason Edens, Executive Director

EDUCATION

M.S. Environmental Studies, Policy and Planning, Bemidji State University, 2007

B.S Secondary Education, Social Science, University of Georgia, 1994

HIGHLIGHTS

- Established 501c3 nonprofit and fostered its growth from a modest organization to one garnering national attention.
- Established an international cycling organization raising awareness of climate change issues, nominated for a UN Environment Program award.
- Over 5 years management experience emphasizing collaborative style.
- Adept at building productive relationships to further the organization's goals.
- Persuasive skills, written and oral.

PROFESSIONAL MANAGEMENT EXPERIENCE

- Supervised and motivated a staff of 7-10, facilitating training, work flow, quality control, conflict resolution, and review processes.
- Directed and managed the installation of scores of solar energy installations.
- Directed and facilitated the research, development and manufacture of a state of the art solar thermal panel.

ORGANIZATION DESCRIPTION

The Rural Renewable Energy Alliance (RREAL) is a 501(c)(3) non-profit organization with the mission to make solar power accessible to people of all income levels. This idea has manifested in the Solar Assistance program, through which solar powered heating systems are provided to low-income families who cannot afford their winter heating bills. In 2005, the organization hired its first Executive Director, Jason Edens, and since then has significantly expanded programs, presented at national conferences, and been awarded "Outstanding Green Venture" from the Initiative Foundation. RREAL has been awarded grants from a wide variety of foundations and organizations, including the Bush Foundation, Otto Bremer Foundation, Blandin Foundation, Minnesota Pollution Control Agency, Lindbergh Foundation, and many more. RREAL has also designed and is now manufacturing a state-of-the-art solar air heating collector.

Since inception, the Rural Renewable Energy Alliance has provided 52 households with solar heating systems in Minnesota, South Dakota, and Wisconsin, and installed 18 solar electric and hot water systems. RREAL solar installations produce over 200,000 kWh annually. Three solar air heat systems installed in the Duluth area in collaboration with Minnesota Power in late 2007 resulted in a baseline case study which proved the potential of solar heating systems as being an integral part of the solution to various problems facing our nation including climate change, energy consumption, and fuel poverty. The 25 systems installed in 2008 were part of RREAL's efforts to complete 150 installations by 2010. RREAL enhances people's lives, reduces poverty, improves the environment and shares knowledge by making renewable energy widely used and accessible to people of all incomes.