EERC
Energy & Environmental Research Center

UNIVERSITY OF NORTH DAKOTA
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April 30, 2008

Ms. Karlene Fine
North Dakota Industrial Commission
ATTN: Renewable Energy Development Program
State Capitol – Fourteenth Floor
600 East Boulevard Avenue
Bismarck, ND 58505

Dear Ms. Fine:

Subject: EERC Proposal 2008-0299 Entitled "Small Wind Turbine Training Center"

Enclosed please find the original and one copy of the subject proposal and the $100 application fee. Since cost share is already in place, the project will commence upon award of North Dakota Renewable Energy funding and be completed as proposed. If you have any questions, please contact me by phone at (701) 777-5293 or by e-mail at bstevens@undeerc.org.

Sincerely,

Brad A Stevens

Bradley G. Stevens, P.E.
Research Manager

Approved by:

for

Dr. Barry I. Milavetz, Associate VP for Research
Research Development and Compliance

BGS/kal

Enclosures

c/enc: Tom Erickson, EERC
Chris Zygarlicke, EERC
Bruce Folkedahl, EERC

SMALL WIND TURBINE TRAINING CENTER

EERC Proposal No. 2008-0299

Submitted to:

Karlene Fine

North Dakota Industrial Commission
ATTN: Renewable Energy Development Program
State Capitol – Fourteenth Floor
600 East Boulevard Avenue
Bismarck, ND 58505

Proposal Amount: $50,000

Submitted by:

Bradley G. Stevens, P.E.

Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Bradley G. Stevens, Project Manager

Dr. Barry I. Milavetz, Associate VP for Research
Research Development and Compliance

April 30, 2008

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SMALL WIND TURBINE TRAINING CENTER

ABSTRACT

The Energy & Environmental Research Center (EERC) Plains Organization for Wind Energy Resources® (POWER®) Program, as part of an existing U.S. Department of Energy (DOE) award, is seeking to expand the scope of activities related to developing a small wind turbine training center.

The small wind turbine training center will consist of up to two small wind turbines less than 20 kW in size. Once constructed, the facility would provide educational opportunities to a wide range of participants including grade school- through college-level students and the general public. In addition, the facility will allow the EERC to provide technical training workshops related to the installation, operation, and maintenance of small wind turbines.

The EERC is requesting funding from the North Dakota Renewable Energy Development fund totaling $50,000 to expand the existing project and increase the understanding of small wind technology in North Dakota. Cost share will be provided by DOE.

SMALL WIND TURBINE TRAINING CENTER

PROJECT DESCRIPTION

Introduction

The Energy & Environmental Research Center (EERC) at the University of North Dakota under an existing award with the U.S. Department of Energy (DOE) is planning to establish a small wind turbine training center.

As established in the DOE award, the EERC will install up to two small wind turbines ranging in size from 1.8 to 20 kW at the site. The EERC also plans to host up to two technical workshops and as many educational events as possible at the site over the course of a 12-month period. The current project will involve the selection, development, and utilization of a site for education and outreach activities related to dissemination of general wind energy information and small wind turbine technology.

The facility will provide educational opportunities to a wide range of participants including grade school- through college-level students and the general public. In addition, the facility will allow the EERC to provide technical training workshops related to the installation, operation, and maintenance of small wind turbines.

DOE Scope of Activities (as proposed and approved)

The following activities will be performed under the existing DOE-sponsored project.

Task 1 – Site Selection and Development

- Identify and prioritize potential sites for development of the small wind turbine technology training center.

- Select a site based on land ownership, site access, electrical interconnection access, proximity to Grand Forks, availability of wind resource (i.e., openness, absence of obstructions), and other characteristics.
- Submit necessary permits and secure site development approval from appropriate governing bodies.

Task 2 – Equipment Procurement and Installation

- Identify up to two small wind turbines to be installed at the small wind turbine technology training center.
- Identify and procure necessary electrical infrastructure to interconnect the wind turbines.
- Negotiate with vendors for the purchase and delivery of small wind turbines.
- Negotiate with local contractors for the installation of electrical infrastructure.
- Install wind turbines and associated electrical devices at the site.
- In addition to the installation of wind turbines, it is the EERC's intent to install a wind-monitoring system that is currently in the EERC's possession.
- If the EERC can secure a funding source, an educational kiosk will be installed to provide a staging area for presentations and facilitated and self-directed tours.

Task 3 – Education and Outreach

- Host up to two technical workshops related to the installation, operation, and maintenance of small wind turbine applications targeting parties throughout the region interested in installing their own small wind turbines.
- Host as many educational events as possible at the site focusing on students from grade school through high school.

Current Status of DOE-Sponsored Project

Task 1 – Site Selection and Development

- A site has been selected for the EERC small wind turbine training facility. The site is owned by the City of Grand Forks and is located on the southwestern edge of Grand Forks.
- The EERC is currently preparing an engineering packet for submittal to the City of Grand Forks for construction approval.

Task 2 – Equipment Procurement and Installation

- Currently, the EERC is planning to install two wind turbines: the Windward Engineering Endurance 4.25 kW and the Southwest Windpower Skysteam 1.8 kW. Installation of the wind turbines is anticipated to take place during Summer 2008.
- Turbine pricing and delivery details have been negotiated.

Task 3 – Education and Outreach

- No workshops or educational events have taken place to date. These events will be held after wind turbines are installed.

North Dakota Renewable Energy Fund Scope of Activities (proposed under this request)

Because of budget constraints, the EERC was only able to purchase and install one or two small wind turbines with the available DOE funds. This funding limit meant that the EERC was only planning to procure and install the wind turbines. With the addition of the North Dakota Renewable Energy Fund (NDREF) award, the EERC would be able to greatly expand the usefulness of the facility to include more research and technically oriented activities.

In an effort to expand an existing award from DOE, the EERC is proposing the following activities under the most recent NDREF funding cycle.

Task 1 – Site Selection and Development

- Most Task 1 activities will be completed by the NDREF award date. Should the permitting process still be ongoing, the EERC may utilitize a small portion of the NDREF funding to complete the permitting.

Task 2 – Equipment Procurement and Installation

- As with Task 1, the intent is to complete Task 2 utilizing DOE project funds. If necessary, the EERC may use some of the NDREF funds for this task. Should NDREF funds be used for Task 2, they would most likely cover costs related to the installation and interconnection of the wind turbines.

Task 3 – Education and Outreach

- Perform a technical evaluation of wind turbine performance for both the Endurance and Skystream wind turbines.
- Provide up to four technical workshops or educational events during the contract period.
- Make the facility and wind turbine data available to high school and college students from surrounding high schools, technical colleges, and universities for use for research and specialized study.
- Provide a monthly project status report to the North Dakota Department of Commerce Division of Community Services (NDDCS) via electronic media.
- Provide a final report to NDDCS summarizing the results of the wind turbine evaluation as well as education and outreach activities.

Summary of Impact and Benefit

Although small wind turbine projects are typically not considered high-impact projects, there is a large segment of the rural population, both in North Dakota and the region, which is very

interested in understanding what opportunities exist for application of small wind turbines for self-generation of electricity. Most of these people are frustrated by the lack of hands-on educational opportunities in which they can engage. This facility would provide such opportunities.

In addition, the EERC has had discussions with industry to utilize the facitility for research related to blade modifications. The EERC will continue to pursue these opportunities.

STANDARDS OF SUCCESS

Although difficult to quantify or account for, it is certain that the proposed tasks will directly increase the knowledge and understanding of small wind energy technology and its application in North Dakota and the surrounding region.

The EERC will document workshop attendance and demographic information, and every attempt will be made to document the project's positive impact on increasing the knowledge base of wind energy in North Dakota.

BACKGROUND/QUALIFICATIONS

Beginning in the mid-1990s with its wind-monitoring activities for American Indian tribes in North Dakota, the EERC has been providing technical expertise related to wind energy. Since then, the EERC has conducted numerous wind resource assessments as well as other wind energy-related activities.

The program most germane to the proposed activities began in 2000 when the EERC, as part of a 6-year program funded by DOE, formed POWER. The focus of POWER has been to develop a regional center of excellence for wind energy for the central and northern Great Plains states by providing objective educational, technical, and partnership-building resources for

developing the region's vast wind energy resources. POWER activities are performed under the following task structure:

Task 1 – Internet Web Site/Database Development

Task 2 – Resource Assessment

Task 3 – Education and Workshops

Task 4 – Training

Task 5 – Development and Demonstration of Wind Technologies

To date, the focus of the POWER Program has primarily been in Task 1 (Web Site/Database Development), Task 2 (Resource Assessment), and Task 3 (Education/Outreach), including the following:

- Three full-color brochures have been created. One discusses the goals and objectives of POWER, and the second answers questions commonly asked by North Dakota landowners regarding large-scale wind energy and leasing land to wind energy developers. A third brochure answers large-scale wind energy questions from landowners across the Great Plains.
- The POWER Web site was created at the outset of the program to provide a source of wind energy information for the layperson and technical professionals. In addition to question-and-answer (Q&A) brochures, access to legislative bills in different states, and pertinent links, the Web site offers users access to a database of wind resource data and the ability to view wind energy information in a geographic information system (GIS) platform. The database consists of wind resource data from approximately 300 sites in 13 Great Plains states. The GIS tool provides wind resource maps, monitoring site locations, and other information that can be viewed and manipulated.

- The EERC and NDDCS combined to create the North Dakota Anemometer Loan Program (NDALP) in 2001 as an education/outreach tool to provide individuals, businesses, municipalities, and economic development groups with qualitative wind resource data. The program received over 200 applications competing for 10 wind-monitoring systems in Round 1 of the NDALP. The wind resource was monitored for almost 2 years at the Round 1 locations. An additional 150 applications were received for Round 2 of the NDALP, which monitored seven sites for approximately 2 years. Round 3 of the NDALP Program focused on wind monitoring at schools. Seven schools were selected as part of Round 3 and are currently being monitored. Most recently, NDDCS has contracted the EERC to perform a detailed wind energy analysis of three of the schools in Round 3 of the NDALP.
- The EERC was also contracted by the Colorado Office of Energy Management & Conservation to provide technical assistance to the Colorado ALP Program during 2005 and 2006.
- The EERC has been a strategic partner with groups like DOE and the National Wind Coordinating Collaborative working to resolve the issues related to electrical transmission of wind energy.
- The EERC and POWER have been key organizing and sponsoring entities of the six North Dakota wind energy conferences that have been held. In addition, EERC personnel have been asked to provide input in organizing conferences in no less than three other states.

- The POWER Program has collected or continues to collect data from its own 40- and 50-m wind-monitoring systems throughout the region, located in Montana, North Dakota, South Dakota, Kansas, Missouri, and Oklahoma.

In fiscal year 2005, The EERC was awarded a project by DOE to address the barrier issues facing North Dakota and the northern Great Plains in general which prohibit expedient and efficient production and transmission of wind energy. The overall goal of this project was to stimulate, through implementation of the following tasks, the development of wind energy in the Great Plains region. These tasks have been accomplishing this by either expansion of new transmission capacity or development of new wind energy capacity through alternative market development:

- Develop and implement the Midwest Renewable Energy Tracking Systems (M-RETS) under the direction of the M-RETS Technical Review Committee. This task was later changed to the establishment of a small wind turbine training center. This activity is currently being performed and represents the cost share being proposed to the NDREF proposal.
- Build on related work under way in the region related to transmission capacity development.
- Develop and demonstrate the efficacy of a wind energy forecast system for use in scheduling power output from wind farms in the Great Plains.
- Develop a road map report for the long-term use of hydrogen in the Great Plains.

MANAGEMENT

The proposed project will be managed by Mr. Brad Stevens. Mr. Stevens is a Research Manager at the EERC. He is the wind energy program manager within the EERC's Centers for Renewable Energy and Biomass Utilization.

Mr. Stevens received his B.S. in Civil Engineering from the University of North Dakota and is a registered professional engineer in North Dakota and Minnesota.

Additional EERC personnel will be utilized as needed to perform turbine installation and operation and maintenance, as well as workshop and educational events. It is also the EERC's intent to engage college-level students from the surrounding universities for a variety of activities at the facility. Surrounding universities would include the University of North Dakota in Grand Forks, North Dakota, Northland Community and Technical College in East Grand Forks, Minnesota, and the University of Minnesota – Crookston in Crookston, Minnesota.

TIMETABLE

The proposed period of performance is July 1, 2008, through June 30, 2009, or 12 months.

BUDGET

The total cost of the project is $100,000, with North Dakota Renewable Energy Development Fund providing $50,000 and DOE providing $50,000. The existing DOE project currently has funds in excess of $50,000, but to accurately demonstrate cost-share requirements, the EERC is "setting aside" $50,000 pending NDREF award. These funds will not be spent until the NDREF project is awarded.

TAX LIABILITY

The EERC—a research organization within UND, which is an institution of higher education within the state of North Dakota—is not a taxable entity.

CONFIDENTIAL INFORMATION

No confidential information is included in this proposal.

PATENTS AND RIGHTS TO TECHNICAL DATA

It is anticipated that no patents will be generated by this proposal.

SMALL WIND TURBINE TRAINING CENTER
NORTH DAKOTA RENEWABLE ENERGY FUND
PROPOSED PROJECT START DATE: 7/1/08
EERC PROPOSAL #2008-0299

BUDGET

CATEGORY			TOTAL		ND RENEWABLE SHARE		DOE COST SHARE	
LABOR		Rate	Hrs	Cost	Hrs	Cost	Hrs	Cost
Stevens, B.	Project Manager	$ 35.74	363	$ 12,974	363	$ 12,974	-	$ -
----------	Senior Management	$ 64.41	16	$ 1,031	16	$ 1,031	-	$ -
----------	Research Scientist/Engineer	$ 36.18	95	$ 3,437	95	$ 3,437	-	$ -
----------	Research Technician	$ 23.64	29	$ 686	29	$ 686	-	$ -
----------	Undergrad-Res.	$ 8.82	70	$ 617	70	$ 617	-	$ -
----------	Technical Support Services	$ 19.31	16	$ 309	16	$ 309	-	$ -
				$ 19,054		$ 19,054		$ -
Escalation Above Base		0%		$ -		$ -		$ -
TOTAL DIRECT HRS/SALARIES			589	$ 19,054	589	$ 19,054	-	$ -
Fringe Benefits - % of Direct Labor - Staff		53%		$ 9,772		$ 9,772		$ -
Fringe Benefits - % of Direct Labor - Undergrad. Research		1%		$ 6		$ 6		$ -
TOTAL FRINGE BENEFITS				$ 9,778		$ 9,778		$ -
TOTAL LABOR				$ 28,832		$ 28,832		$ -
OTHER DIRECT COSTS								
TRAVEL				$ 24		$ 24		$ -
EQUIPMENT > $5000				$ 50,000		$ -		$ 50,000
COMMUNICATION - PHONES & POSTAGE				$ 25		$ 25		$ -
PRINTING & DUPLICATING				$ 49		$ 49		$ -
OPERATING FEES & SVCS								
Graphics Support				$ 2,320		$ 2,320		$ -
TOTAL DIRECT COST				$ 81,250		$ 31,250		$ 50,000
FACILITIES & ADMIN. RATE - % OF MTDC		VAR		$ 18,750	60.0%	$ 18,750	47.7%	$ -
TOTAL PROJECT COST				$ 100,000		$ 50,000		$ 50,000

Due to limitations within the University's accounting system, bolded budget line items represent how the University proposes, reports and accounts for expenses. Supplementary budget information, if provided, is for proposal evaluation.

SMALL WIND TURBINE TRAINING CENTER
EERC PROPOSAL #2008-0299

BUDGET - TRAVEL

RATES USED TO CALCULATE ESTIMATED TRAVEL EXPENSES

DESTINATION	AIRFARE	PER MILE	LODGING	PER DIEM	CAR RENTAL
Grand Forks, ND (west side)	$ -	$ 0.33	$ -	$ -	$ -

PURPOSE/DESTINATION	NUMBER OF TRIPS	NUMBER OF PEOPLE	NUMBER OF MILES	NUMBER OF DAYS	AIRFARE	MILEAGE	LODGING	PER DIEM	CAR RENTAL	MISC.	TOTAL
Site Trip/Grand Forks, ND	12	1	6	1	$ -	$ 24	$ -	$ -	$ -	$ -	$ 24
TOTAL ESTIMATED TRAVEL											$ 24

DETAILED BUDGET - EQUIPMENT

Wind Turbine	$ 50,000
	$ 50,000
Total Equipment	$ 50,000

SMALL WIND TURBINE TRAINING CENTER
EERC PROPOSAL #2008-0299

DETAILED BUDGET - EERC RECHARGE CENTERS

Graphics Support	Rate	#		$Cost
Graphics (hourly)	$58	40	$	2,320
Subtotal			$	2,320
Escalation		0%	$	-
Total Graphics Support			$	2,320

BUDGET NOTES

ENERGY & ENVIRONMENTAL RESEARCH CENTER (EERC)

BACKGROUND

The EERC is an independently organized multidisciplinary research center within the University of North Dakota (UND). The EERC receives no appropriated funding from the state of North Dakota and is funded through federal and nonfederal grants, contracts, and other agreements. Although the EERC is not affiliated with any one academic department, university faculty may participate in a project, depending on the scope of work and expertise required to perform the project.

INTELLECTUAL PROPERTY

If federal funding is proposed as part of this project, the applicable federal intellectual property (IP) regulations may govern any resulting research agreement. In addition, in the event that IP with the potential to generate revenue to which the EERC is entitled is developed under this agreement, such IP, including rights, title, interest, and obligations, may be transferred to the EERC Foundation, a separate legal entity.

BUDGET INFORMATION

The proposed work will be done on a cost-reimbursable basis. The distribution of costs between budget categories (labor, travel, supplies, equipment, etc.) is for planning purposes only. The project manager may, as dictated by the needs of the work, incur costs in accordance with Office of Management and Budget (OMB) Circular A-21 found at www.whitehouse.gov/omb/circulars. If the Scope of Work (by task, if applicable) encompasses research activities which may be funded by one or more sponsors, then allowable project costs may be allocated at the Scope of Work or task level, as appropriate, to any or all of the funding sources. Financial reporting will be at the total-agreement level.

Escalation of labor and EERC recharge center rates is incorporated into the budget when a project's duration extends beyond the current fiscal year. Escalation is calculated by prorating an average annual increase over the anticipated life of the project.

The cost of this project is based on a specific start date indicated at the top of the EERC budget. Any delay in the start of this project may result in a budget increase. Budget category descriptions presented below are for informational purposes; some categories may not appear in the budget.

Salaries: The EERC employs administrative staff to provide required services for various direct and indirect support functions. Salary estimates are based on the scope of work and prior experience on projects of similar scope. The labor rate used for specifically identified personnel is the current hourly rate for that individual. The labor category rate is the current average rate of a personnel group with a similar job description. Salary costs incurred are based on direct hourly effort on the project. Faculty who work on this project will be paid an amount over their normal base salary, creating an overload which is subject to limitation in accordance with university policy. Costs for general support services such as contracts and intellectual property, accounting, human resources, purchasing, shipping/receiving, and clerical support of these functions are included in the EERC facilities and administrative cost rate.

Fringe Benefits: Fringe benefits consist of two components which are budgeted as a percentage of direct labor. The first component is a fixed percentage anticipated to be approved for use beginning July 1, 2008, by the UND cognizant audit agency, the Department of Health and Human Services. This portion of the rate covers vacation, holiday, and sick leave (VSL) and is applied to direct labor for permanent staff eligible for VSL benefits. Only the actual approved rate will be charged to the project. The second component is estimated on the basis of historical data and is charged as actual expenses for items such as health, life, and unemployment insurance; social security; worker's compensation; and UND retirement contributions.

Travel: Travel is estimated on the basis of UND travel policies which can be found at www.und.edu/dept/accounts/policiesandprocedures.html. Estimates include General Services Administration

(GSA) daily meal rates. Travel may include site visits, field work, meetings, and conference participation as indicated by the scope of work and/or budget.
Equipment: If equipment is budgeted, it is discussed in the text of the proposal and/or identified more specifically in the accompanying budget detail.

Supplies – Professional, Information Technology, and Miscellaneous: Supply and material estimates are based on prior experience and may include chemicals, gases, glassware, nuts, bolts, and piping. Computer supplies may include data storage, paper, memory, software, and toner cartridges. Maps, sample containers, minor equipment, signage, and safety supplies may be necessary as well as other organizational materials such as subscriptions, books, and reference materials. General purpose office supplies (pencils, pens, paper clips, staples, Post-it notes, etc.) are included in the facilities and administrative cost.

Subcontracts/Subrecipients: Not applicable.

Professional Fees/Services (consultants): Not applicable.

Other Direct Costs

Communications and Postage: Telephone, cell phone, and fax line charges are generally included in the facilities and administrative cost. Direct project costs may include line charges at remote locations, long-distance telephone, postage, and other data or document transportation costs.

Printing and Duplicating: Photocopy estimates are based on prior experience with similar projects. Page rates for various photocopiers are established annually by the university's duplicating center.

Food: Food expenditures for project meetings, workshops, and conferences where the primary purpose is dissemination of technical information may include costs of food, some of which may exceed the institutional limit.

Professional Development: Fees are for memberships in technical areas directly related to work on this project. Technical journals and newsletters received as a result of a membership are used throughout development and execution of the project by the research team.

Fees and Services – EERC Recharge Centers, Outside Labs, Freight: EERC recharge center rates for laboratory, analytical, graphics, and shop/operation fees are anticipated to be approved for use beginning July 1, 2008. Only the actual approved rates will be charged to the project.

Laboratory and analytical fees are charged on a per sample, hourly, or daily rate, depending on the analytical services performed. Additionally, laboratory analyses may be performed outside the university when necessary.

Graphics fees are based on an established per hour rate for production of such items as report figures, posters, and/or PowerPoint images for presentations, maps, schematics, Web site design, professional brochures, and photographs.

Shop and operation fees are for expenses directly associated with the operation of the pilot plant facility. These fees cover such items as training, personal safety (protective eyeglasses, boots, gloves), and physicals for pilot plant and shop personnel.

Freight expenditures generally occur for outgoing items and field sample shipments.

Facilities and Administrative Cost: Facilities and administrative cost is calculated on modified total direct costs (MTDC). MTDC is defined as total direct costs less individual items of equipment in excess of $5000 and subawards in excess of the first $25,000 for each award.