March 13, 2008

Mr. Bill J. Huether,

North Dakota State Engineer

Bismarck, N.D. 58505-0500

Dear Mr. Huether:

I am responding to your email of Monday, March 10, 2008 in which the results of our grant proposal's technical review were disclosed. We would appreciate an opportunity to present to the Renewable Energy Council when appropriate, however we are also providing the following information in response to comment by the technical reviewers. Page limitations associated with our original application did not permit provision of detail at the level expected by the reviewers, and it is our hope that the information provided below and attached as a separate file to this transmittal will respond, at least in part, to questions raised by the reviewers.

1. Goals & Objectives of "Abundant Energy: A Proposal for Wind Power Development and Technical Education." As noted by both reviewers, the objectives encompass purchase and installation of a 1.65 MW wind turbine and design and implementation of a wind turbine technical training program. The wind turbine is expected to significantly contribute to the intent of Lake Region State College to enhance its "green" energy footprint by using wind power to energize the entire campus and convert wind energy to heat through storage in the campus boilers. Additionally, the proposed wind turbine technical training program cannot exist without access on an academic calendar schedule to a wind turbine, its tower, transmission components, switching technology, and associated peripherals. Reviewer # ! is correct in noting how the proposed initiative responds to the Renewable Energy Council's goals and objectives. And, the wind turbine training program contributes directly to workforce development within North Dakota and adds value to manufacturing capability and wind energy generation capability currently on line or planned across the immediate future.

In response to Reviewer # 2 – Wind power would replace LRSC's total reliance upon natural gas to fuel campus boilers; additionally wind power would be the primary source of electricity for all other campus needs. With wind power as the primary source for heating/cooling, natural gas would be used only during times when wind energy could not match campus demand. In addition, a natural gas standby generator (not petrol or diesel) would be installed in a separate structure to provide back-up power given the need to power the campus and its laboratories and dormitories during inclement weather. The standby generator is sized to accommodate campus needs for power across the foreseeable future. Taken together, these developments would contribute in a substantial way to the "greening" of our campus environment. Further, the proposal indicates that all three power sources will be fused through a single switching mechanism, as recommended and designed by our consulting engineer; and that switching mechanism is also designed to integrate with our current primary provider of electricity, Otter Tail Power Company.

2. Achievability Status of Proposed Objectives. Reviewed # 1 is correct in noting the breakout of proposed savings between payoff of the proposed 10 year note, and the on-going operational cost of the wind turbine and wind turbine technician training program. Interaction between FPL Energy, LLC, Sequoia Energy, Inc, and Outland Energy, Inc (Canby, MN) has explored potential donations of wind turbine components, training software, switching mechanisms, electro-mechanical laboratory training apparatus, as well as access to operational wind turbines near Langdon, ND and Rolla, ND for training purposes, and use of seasoned wind technicians employed by these firms as Lake Region State College adjunct faculty within the proposed training program.

   Reviewer # 2 has concern about the overall budget for the proposed wind tower initiative. Attached is a copy of the report entitled *Lake Region State College Wind Energy with Boiler Conversion Feasibility Study* authored by EAPC Architects & Engineers which addresses these projected cost estimates for the wind turbine in some detail, and whose data we relied upon when constructing our proposal. Additionally, the curriculum development phase of this project is priced at $35,000…admittedly modest, but achievable given that two other community colleges within the Midwest (southwestern Minnesota and northwestern Iowa) have designed and implemented wind turbine technician training programs which Lake Region State College can access (and has site-visited) to maximize its modest investment.

One other college, located in South Dakota, has deployed a bioenergy training program, however its curricula attention to wind energy technician training is rather light, comprising a few weeks of total instructional and laboratory time. Lake Region State College's actual training program implementation cost is not embedded within the proposed budget – that will be addressed in a different manner.

3. Quality of the Methodology. The report referenced above, authored by EAP Architects & Engineers details our wind study conclusions, the match between our campus's total electricity load and output expected of the wind generator, and basic assumptions embedded within the equipment sizing, utilization, and payback analyses. These were referenced in our proposal, but due to page limitations, were not explored in detail. Site maps, wind energy analyses, net energy output calculations, utility analyses, cash flow analyses, and wind turbine (and peripherals) cost estimates are embedded within the referenced report.

   Reviewer 1: In response to how many wind technician training programs are currently in existence in the upper Great Plains, there are three. One wind technician training program is located in Iowa, one program located in Minnesota, and one program located in South Dakota, which is committed to the entire biofuel industry. Currently, there are three companies in North Dakota looking to hire wind technicians, one company in Saskatchewan, Canada, one company in South Dakota, and one company in Minnesota.

   In regards to companies filling wind technician jobs, the companies are looking for more employees. Often times what companies experience is filling a position with a person from out of state. Given the harsh climate of North Dakota, many employees resign when the weather turns colder. As a result, wind companies realize a high turnover in employees. If funded, Lake Region State College would be able to train North Dakota students to maintain towers within the state. As a result, a percentage of students would ultimately secure positions with wind energy companies within North Dakota thus reducing the high turnover rate.

   Reviewer 2: Lake Region State College did a feasibility study in the fall of 2006 to assess the efficacy of replacing the gas-fired boilers with newer, more efficient electric boilers that will be powered by a wind turbine near the LRSC campus. Along with these responses is an attached file that contains the feasibility study prepared by EAPC Architects Engineers.

On page 8, there is an overhead graphic representation of the windmill site, as well as the adjacent LRSC campus. Additionally, an Estimated Annual Energy Production report was generated by EAPC. The report, located on page 12, gives an analysis of what the wind turbine would produce in context to what college would require of a wind tower. Above and beyond the wind turbine analysis is a comparative utility analysis of normal energy use contrasted with energy use with the wind turbine.

4. The Scientific and/or Technical Contribution of the Proposed Work. The reviewers have correctly noted most benefits, including generating the needed data pertaining to direct energy transfer from wind to heat (and chilled) water storage, use of campus-wide green initiatives, and the feasibility of powering an entire institution of higher learning (or other 'campus-like' setting/institution) primarily from a green energy source – wind.

5. The PI's Awareness of Current Research Activity and Published Literature. Reviewer # 1 has correctly noted our overstatement of the lower and upper-bound estimated need for wind energy technicians. Assuming the industry standard of two technicians for each 20 wind turbine generators holds for the near future, the total number of wind energy technicians needed to maintain and repair the current state-level inventory of erected and under construction wind turbines would be 60 technicians. However, our estimate of the total number of wind energy turbines erected within North Dakota by 2011 (350) is too low; that figure should be increased by another 200 turbines, assuming all announced developments presently on the drawing boards can be constructed on schedule. If that happens, another 20 wind energy technicians would be needed by 2011. This demand is also fueled by one notable observation of our private sector collaborators: North Dakota's current wind energy technician workforce is largely recruited from the southern states of our nation… as their first winter experience within North Dakota draws to a close, most have vanished or exhibit plans to do so! In response, Lake Region State College has sought permission and been granted approval to develop and field North Dakota's only wind technician training program.

   Reviewer # 2 has noted the need for firm managerial direction, and significant participation from our proposed private sector partners, including our current electricity supplier, and our need for engineering input. Our proposal acknowledged need for managerial direction which we are prepared to deploy. Mr. Douglas Darling, Vice President of Instructional Services is responsible for all phases of training program design, curriculum development,

and faculty recruitment. Mr. Corry Kenner, Vice President of Administrative Services is responsible for all fiscal aspects of the proposed endeavor. Mr. Donald Jorgenson, Physical Plant Director, is responsible for the wind tower portion of our proposed initiative, the standby generator activity, all utility interfacing, etc. Our current college president, Dr. Sharon Etemad, and our incoming college President, Dr. Mike Bower will coordinate all phases of the proposed effort. Engineering input is built into our cost estimate, as detailed in the report prepared by EAPC Architects & Engineers; however, no engineering firm has been engaged for the construction /renovation phases pending outcome of this review. Our proposal writer takes full responsibility for identifying the wrong electricity supplier; indeed that utility has been involved from the outset, as evidenced in our engineering consultant's report. And, our on-going interaction with other private sector partners has proceeded to more formal stages, however written agreements among the involved entities await outcome of this review process.

6. Background of the Investigators. No comment is needed.

7. The Project Management Plan. Reviewer # 1 wishes for more detail about LRSC's in-kind: included are the costs of training program curriculum design, recruitment of program faculty, and initial in-house acclimation of such faculty. The revenue dollar figure for tuition revenue is $70,000 and the operating expense of the wind turbine is projected at $65,900. Review # 2 notes and issue with involvement of our electrical utility; however that involvement was sustained across the time line of the engineering feasibility study. The study also outlined applicable electrical tariffs, etc.

8. Justification for Purchase of Equipment. Due to space limitations associated with the original proposal, details pertaining to equipment for the instructional program and some wind turbine components were not identified. The instructional program possesses need for instructional stations outfitted with electro-mechanical laboratory mockups, pre-wired components which are standard on wind turbines, adequate bench and storage space, instructional software, teaching aids, winches, light-duty crane, etc. We are the second of two institutions nationally that train Simulator Maintenance Technicians…training which employs student workstations similar to those of the proposed wind technician training program. Additionally, our Diesel Mechanics training program already possesses the instructional components for wind turbine transmission repair. Instructional space for the proposed wind

technician training program is being sought, and should the current review process yield favorable review and the pending request of the Emergency Commission and Legislative Budget Commission be approved, Lake Region State College is prepared to move aggressively into final project design and implementation. Reviewer # 2 noted that utility switching equipment needs to be included in the wind turbine effort; the EAPC analysis (attached) seeks to include that item.

9. Analysis of the Facilities and Equipment Available for the Proposed Initiative.

Reviewer 1: All equipment and laboratory needed for a wind technician training program are all held in hand by Lake Region State College. Much of the equipment is currently being utilized by the simulator technician program that LRSC houses. The electro-mechanical makeup of the simulation machines provides ample training capacity for other venues, such as wind technician training. Additionally, the wind tower itself will provide real-world experience for students enrolled in the proposed wind technician training program.

Reviewer 2: As noted in question 2, our private sector partners have indicated that they willing to provide resources to assist the wind energy project in a timely manner. With this in mind, Appendix A of the Lake Region State College Wind Energy with Boiler Conversion Feasibility Study takes all construction, purchase, replacement, and all other costs into consideration to the overall cost of the project.

10. Analysis of the Proposed Budget "Value" Relative to the Outlined Work and Financial Commitment from Other Sources. Reviewer # 1 notes the need for firm commitments from private sector entities identified as collaborators; Lake Region State College concurs and is prepared to pursue that matter upon favorable outcome of the current review. Escalation of cost was addressed in our proposal…generally we increased cost estimates by 10% - 15% above those embedded in the EAPC analysis. We disallowed the federal production tax credit in our cash flow calculations as it has not been sufficiently explored to date with our proposed private sector collaborators (however they are aware of it and potential benefit). Our earlier energy studies, and our unfolding 'green campus' activities are fully eligible for match and were deliberately not funded with state energy office funds, rather with resources from our on-going operations. With respect to other matters of note, hopefully, the EAPC analysis will clarify most

details. Reviewer # 2 correctly notes that exploration of the utility of a heating system to store energy converted from wind power constitutes a viable research initiative. And Reviewer # 2 also correctly notes that design and implementation of a wind turbine technician training program does not constitute a research project. The other matters referenced by reviewer # 2 are addressed, in some detail, in the attached report produced by EAPC Architects & Engineers,