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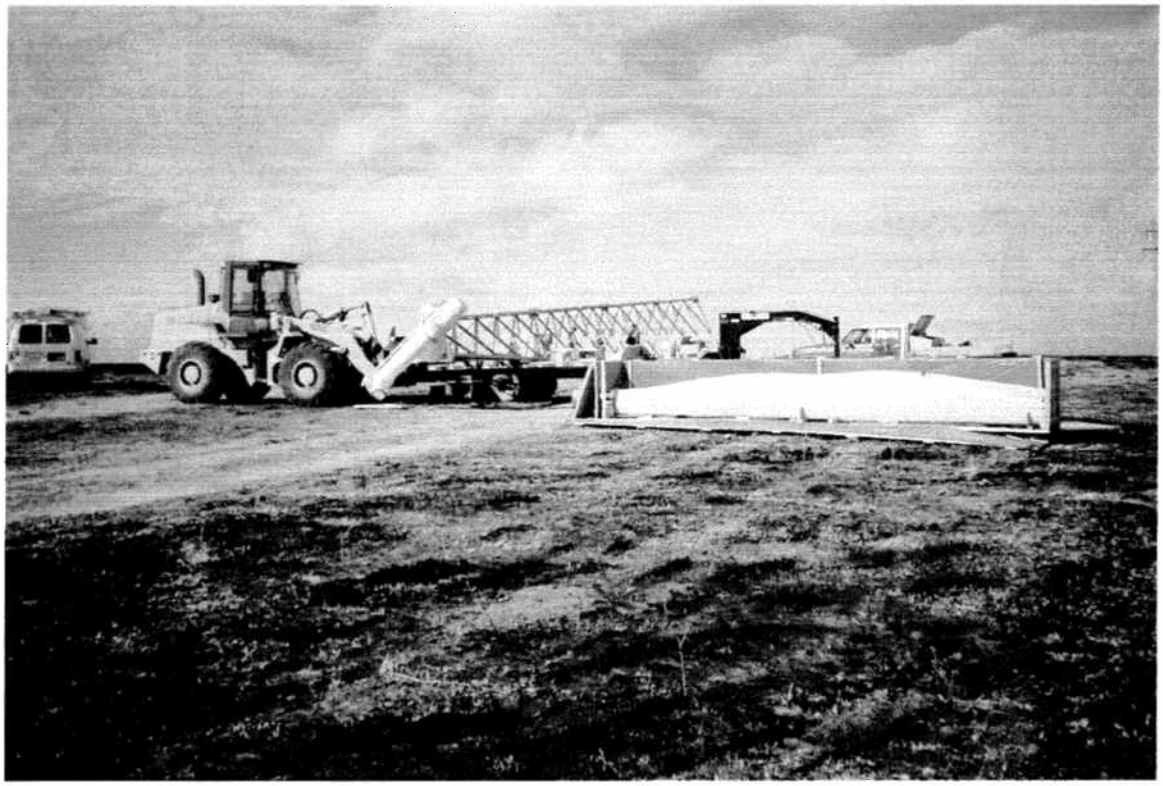
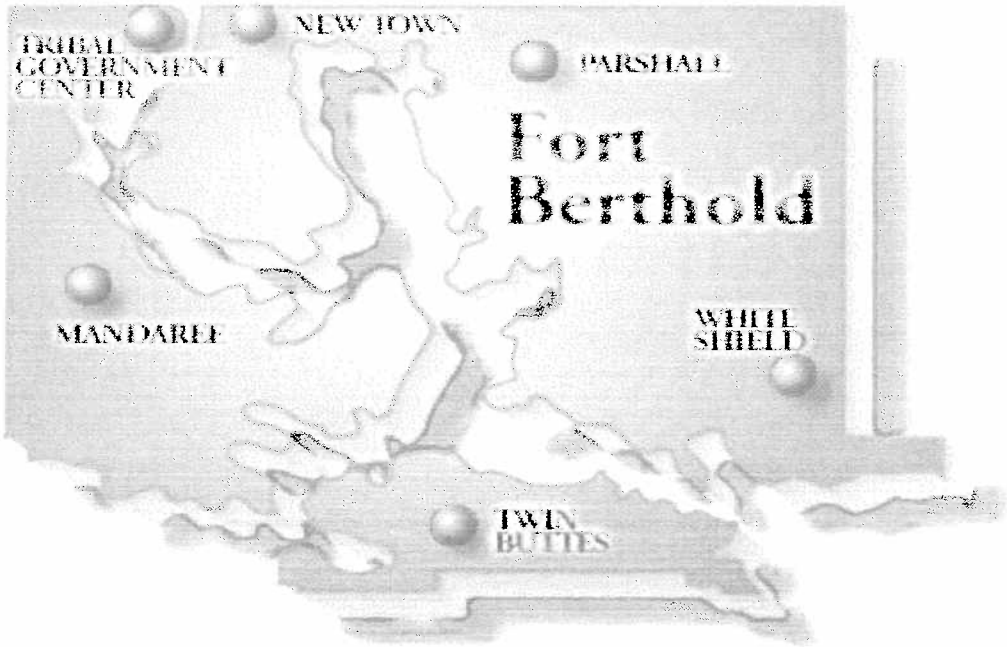


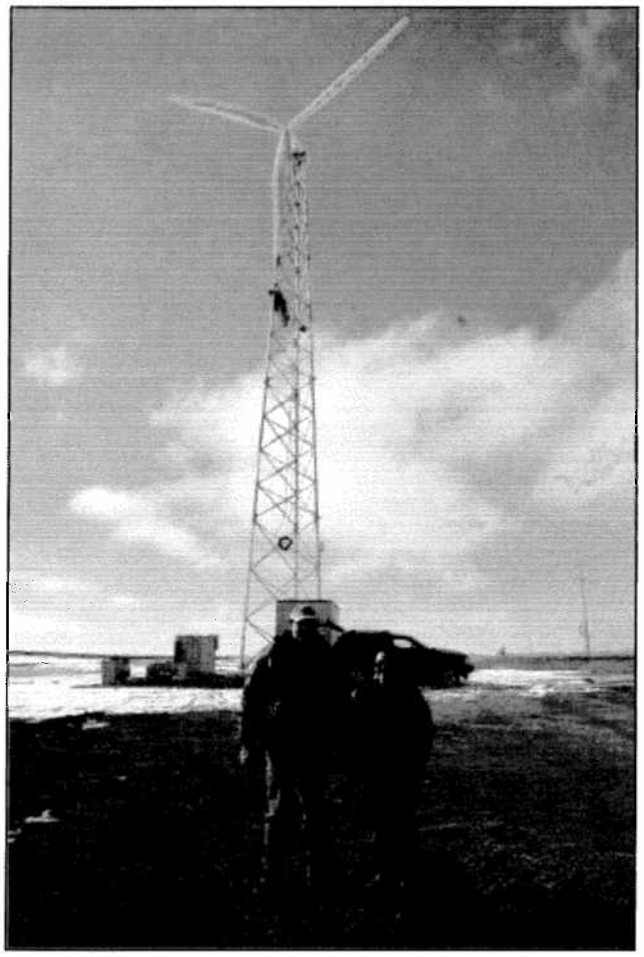


EXECUTIVE SUMMARY

The "Utility-scale Wind Turbine Demonstration Project on the Fort Berthold Indian Reservation in North Dakota" period began September 19, 1999 and ended December 31, 2005 with a completed wind assessment and commissioning of a 66 Kw AOC wind turbine on tribal land.

This demonstration project was implemented by a matching grant between the Federal Department of Energy (DOE) and the Three Affiliated Tribes of Fort Berthold to off-set costs to the tribally owned Four Bears Casino. Through all the efforts to establish and realize a completed and working project, the demonstration project has helped paved the way for future developments for two larger wind projects currently in the feasibility phase.

By gaining knowledge in wind energy and energy fields through various trainings provided by Tribal Energy Program, the Three Affiliated Tribes, Wind Energy Department, is currently establishing total energy load with-in the tribal boundaries to create the economic modeling for sizing a wind farm for the purpose of local energy Distribution, Power Purchase Agreements, Interconnection Agreements, Green Tag Agreements and the transmission issues for the market of wind energy to other areas of the United States.



Project Overview

The Three Affiliated Tribes are interested in exploring wind energy to determine how this renewable energy could be utilized to foster local economic development and contribute toward tribal energy independence by providing clean, renewable energy.

The Three Affiliated Tribes installed a 66 Kw Atlantic Orient Company (AOC) wind turbine on the Fort Berthold Indian reservation to provide electric power to the Four Bears Casino, a tribally-owned facility. This demonstration turbine has provided the tribe with valuable knowledge and experience in wind energy technology, allowing the tribe to make better-informed decisions regarding how wind energy will contribute to economic development, energy independence, and self-reliance.

Located in Northwestern North Dakota, the Fort Berthold Reservation was originally established by the Fort Laramie Treaty of 1851. The current boundaries, as determined by an Act of Congress in 1891, encompass approximately 986,000 acres or 1550 square miles. Portions of six North Dakota counties are included within the reservation's exterior boundaries.

Fort Berthold is home to members of the Mandan, Hidatsa, and Arikara Tribes. While approximately 12,000 members are enrolled on the reservation, only 6,000 members actually reside there. The 5,600 non-Indians living within the exterior boundaries augment this population. The economic base of the reservation is almost entirely agricultural, with oil, gas, and coal exploration/development as a secondary contributor.

Preliminary site selection activities suggested that the wind turbine will be located on a plateau just north of Highway 23. The land rises abruptly more than 350 feet above nearby Lake Sakakawea to the plateau.

Objectives

The Three Affiliated Tribes' objectives in process:

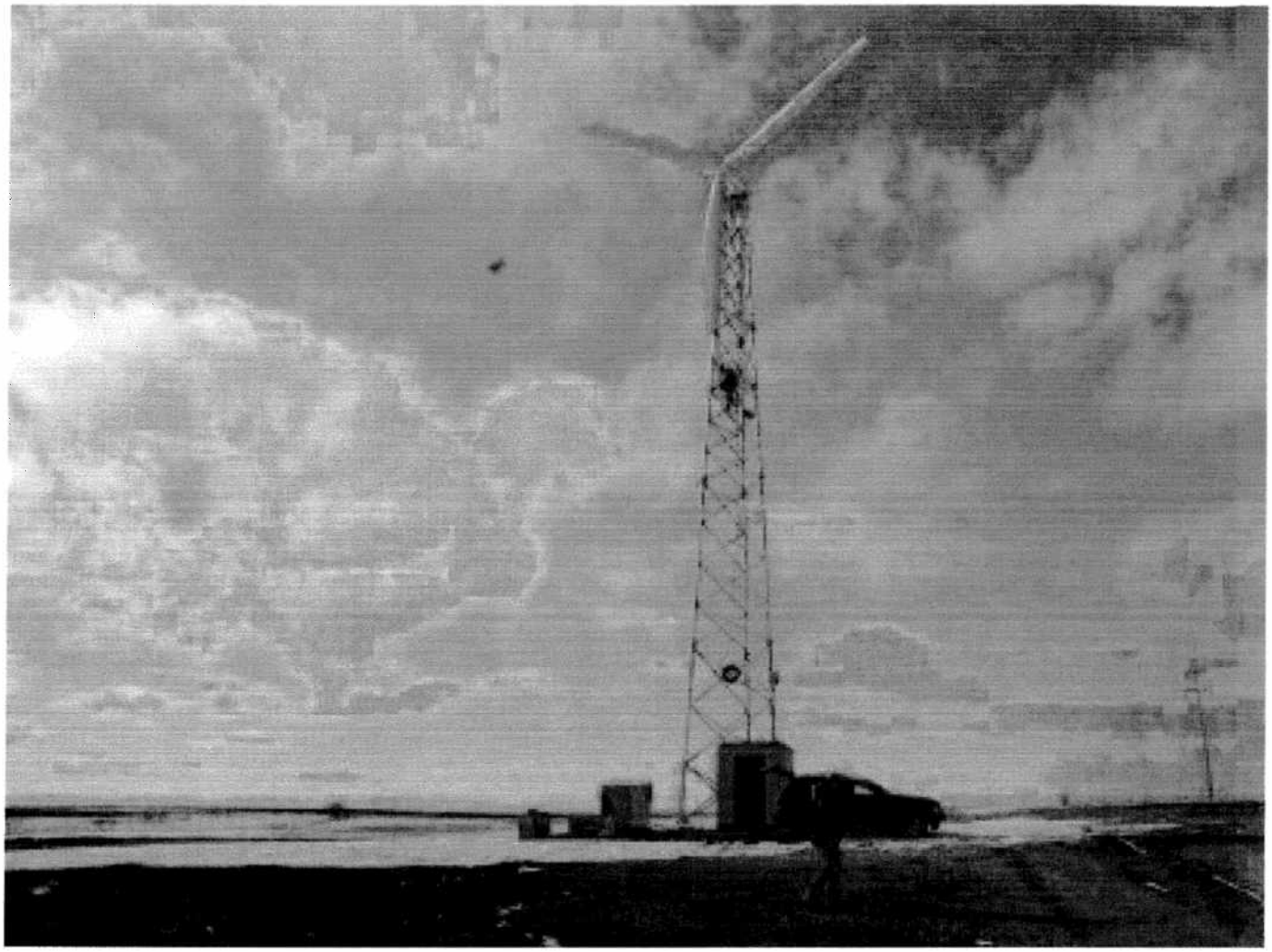
- To gain a better understanding of wind energy technology in order to evaluate its potential for creating economic opportunities for the Tribes as well as a means to achieve some level of energy independence.
- To provide actual performance data and hands on experience for students, instructors, researchers, political leaders, and tribal planners with regard to development of large-scale wind energy projects on the Fort Berthold Reservation.
- To perform preliminary economic assessment of a large-scale wind farm site on the Fort Berthold Reservation.
- To increase awareness and acceptance of wind energy development on the Fort Berthold Reservation and to provide a working example of current wind energy conversion technology.
- To provide a focus and a platform for educational programs on the Fort Berthold Community College campus through technical training, business training, and environmental studies.
- To provide a forum to initiate and strengthen the essential working relationships among tribal members and state, federal, utility, energy research, and commercial energy development people.

The Tribes intent to pursue these objectives has been established with hands-on experience in the procurement, Power Purchase Agreement, Interconnection Agreement, Green Tag Agreement, installation, commissioning, wind-smith training, operation, and maintenance of the 66 Kw utility-scale wind turbine project.

The Fort Berthold Community College established an Associate of Science Degree for Energy Technology, where renewable energy is part of the program.

The Tribe has established working relationships with renewable energy consultants, developers, funding prospects, engineers, tribal nations, state and federal energy departments, congressional people, investors, and public awareness.

The Tribe is currently nearing the end Phase I of two Feasibility Studies on established sites for large-scale commercial wind farms. The studies are revealing class 5 and 6 wind speeds at 80 meters. The tribe is preparing for Phase II of the wind development process.



Description of Activities Preformed

Wind Feasibility Study Process to Turbine Installation Process and completed as follows:

1. Land Agreements

- Directed by Jim Heckman, Director, Environmental Department, TAT, 1999
- Hired consultant: Jay Haley, P.E. For EAPC Architects Engineers, May 24, 1999
- Hired consultant: Bradley Stevens, P.E. Research Engineer, EERC to work jointly with Mr. Haley under a scope of work to complete project coordination and planning, wind turbine siting, installation, and reporting.

- Approved site by council action: Allot # T1853-B, Description: SE1/4SW1/4NE1/4NE1/4NE1/4, Section 16 T152N-Rg 3W, Owner: TAT .62 acres, 82.5 x 82.5, Misc: 660 ft. Right of Way
- Mr. Heckman told Four Bears Community Board of Directors of location and best site for wind energy.
- Soil samples assessed by Geotechnical Exploration February 6, 2001.
- Shopping for used 100 Kw wind turbine, never located.
- Mr. Haley took another job elsewhere, left TAT, project sat dormant till 2001.
- September, 2003, Tribal Council directed Terry Fredericks to oversee, assess, and revise existing grant and bring into compliance with DOE and complete project.
- Grant revised and approved September 23, 2003.
- Contacted Jay Haley as to progress report, Mr. Haley was busy on another project.
- Met with Mr. Haley at Senator Dorgan's Wind Energy Conference in Bismarck in March. Requested Mr. Haley to work on project with a response time of two weeks, no response.
- Met with Disgen of Colorado for new feasibility study and they said they would help me finish the turbine project and stay in compliance with contract.
- Tribe terminated contract with EAPC and EERC for non-response.
- Tribe hired Disgen as our consultant to wind projects.

2. Wind Assessment

- Received electronic version and draft of wind assessment from EERC, December, 2003.
- Disgen assessed and advised.
- 40 meter Met tower was erected in 1999 with approximately 2 years of recorded data, realizing 13 mph consistent wind. Approved to move forward on project.

3. Environmental Review

- The Environmental Assessment was completed with approval to proceed on, September, 2003 by Contractor: Greystone Environmental Consultants of Colorado.

4. Cultural Review

- The Cultural assessment was completed by Cultural Preservation Office and State Historical Society of N.D. with no historic properties affected for the project on August 27, 2003.

5. Economic Modeling

- Disgen of Colorado and our developer Entegrity Wind, (AOC) assisted in this small project which is delivering net-metering to the Four Bears Casino.

6. Interconnection Studies

- Assessed and addressed by Disgen of Colorado to Tribe.
- Power sale agreement dictates the interconnection method.
- Interconnection Agreement signed: September, 2005.

7. Permitting

- Completed through Tribal Resolution on Tribal land and approved by the Bureau of Indian Affairs, New Town, N.D.

8. Sales Agreements

- Most Challenging: Basin Electric approves transactions of local co-ops.
- McKenzie Electric Cooperative is only electric company is area of turbine site.
- Basin Electric: Power Purchase starting price – 1.1 cents per Kw h and .9 cents for the Green Tag sale, bundled into one package of 2 cents and that was that.
- Tribe would not sign this unfair agreement and battled for approximate a year and a half to get the PPA and the GT Agreements separated with larger sale on order to be able to pay off turbine costs and see benefits in a reasonable time.
- Disgen, Intertribal COUP, and developer assisted in negotiations.
- I met with FERC at Senator Dorgan's Wind Energy Conference in Grand Forks, ND on issue when a member of Basin Electric was present.
- Spoke on this issue with both Senate Majority Leader and House Minority Leader and other congressional state leaders in Bismarck, ND.
- On September 12, 2005 the Tribe signed a Green Tag Agreement with Native Energy, LLC, for 3 cents per KWH
- On December 22, 05 the Tribe signed a Power Purchase agreement for 2.5 cents per KWH with McKenzie Electric Cooperative.

9. Financing

- Funded by: DOE: $230,284.00
  Awardees: $57,571.00
  Total: $287,855.00

10. Turbine Procurement

    - At the recommendation of Disgen, the Tribe purchased a new and proven to work in severe weather conditions, a 66 KW AOC wind turbine from Atlantic Orient Corporation.
    - Purchased in May 2003.

11. Construction Contracting

- Hook-up design
  - Distributed Generations Inc. and McKenzie Electric Co-op
  - Completed August, 2005
- Foundation design
  - Contractor: HEYER & LOOS Engineering, Inc. (design 18' x 18' slab for 80 ft. tower)
  - Contractor: Fort Berthold Development Corporation (FBDC), (supplied labor, equipment & built 6' x 6' electrical shed)
  - Lay-out of site completed by TAT, Wind Coordinator
  - Completed September, 2005
- Foundation
  - Contractor: Little River Construction
  - Assistance by Entegrity Wind Systems Inc. (Formally, AOC), Developer
  - Foundation completed: September, 2005
- Turbine shipped to site
  - September,2005
- Turbine Preparation
  - Assemble of 80 ft. Lattés Tower by Contractor: FBDC
  - Assemble of Turbine: TAT Wind Energy Coordinator, FBDC, Disgen Engineer, On phone with Malcolm Lodge, Developer.
  - Completed: September, 2005

- Turbine Erection
  - Contractor: Borsheim Crane Service
  - Two cranes on-site
  - Completed turbine erection and installation: September 30, 2005

- Hook-up
  - Contractor: LHA Engineers, Inc. Bruce Laugtug, P.E. on-site and responsible for signing off on: Electrical Drawings and Specifications, Electrical work required, Coordination of transformer and metering requirements with McKenzie Electric Cooperatives P.E., Negotiating proposals for electrical contracts, materials, equipment, and services, review and approve of all Electrical Contractors work and stamp of approval on all work by registered engineer. And final inspection of electrical contractor has completed his work to contract.
  - Electrical Contractor: Bergstrom Electric, Inc. on-site and responsible to LHA Engineers, Inc. and Owner (TAT) for: Work, Materials and Equipment for trenching and installing required electrical features in design.

- McKenzie Electric Cooperative contracted to provide by contract approval, 3-phase line dug-in and trenched to transformer and turbine site from sub-station by design, approve electrical hook-up and transfer of power from turbine to TAT facility.
- Completed: September, 2005

- Windsmith Training
  - By Entegrity Wind Systems developer, Malcolm Lodge with TAT Wind Energy Coordinator, TAT Maintenance Director, and IT computer programmer.
  - Training completed: February, 2006
- Commissioning
  - By Entegrity Wind Systems Inc. developer, Malcolm Lodge
  - Completed and turbine producing power: February, 2006

12. Operations and Maintenance

- Overseeing responsibility: TAT Wind Energy Department
- Daily operations responsibility: TAT Maintenance Director

Conclusions and Recommendations

In conclusion and in my delightful experience in completing the "Wind Energy Turbine Demonstration Project", new to Fort Berthold, it was a very challenging task to Coordinate, Direct, Report, Contract, Schedule, Educate, and Develop a tribal department in what is becoming one of the most sought after energy sources in the State of North Dakota, as well as the United States in general, because of the high-rise in cost of home-heating resource's and per-gallon gasoline at the pump from dependency on Foreign Energy and global warming issues.

This project has lead myself and various other tribal members into a desire to fulfill the unmet needs established by acts of congress, hindering and costly to health and welfare of the tribe and tribal nations sovereignty, undeveloped energy resources, and cultural values. Only through support of the Federal Energy Programs, directed by established and good-hearted individuals of Department of Energy and Department of Interior can Tribal Nations protect themselves though education and technical support sponsored by the Federal Government in developing Tribal Energy.

Having been involved in the Federal Tribal Energy Program, administered by the Department of Energy, Golden Field Office, Colorado, and NREL trainings, such as, WEATS, and understanding Peak-Oil and the ill effects it may bring with it in the near future to Tribes, I recommend:

- The Federal Government uphold "Trust Responsibility" to all Treaty Tribes and support, protect and provide:
  - Recognition of Tribal sovereignty
  - Tribal Right of Ways
  - Tribal court systems, qualified

- Jurisdiction
- Tribes onto the Federal Electrical Grid System
- Partnering and/or tribal ownership of percentage of Grid
- Continued funding for energy development to tribes
- Continued education and technical support to tribes
- Needed tribal language into the Energy Bill being requested
- Enabling tribes to contract with the Federal Government pertaining to long lasting "Power Purchase Agreements" and "Interconnection Agreements"
- Economical energy pricing (avoided costs and wheeling charges)
- Opportunities for tribes to develop themselves and become independent

Lessons Learned

- Wind Energy development on tribal land is possible
- Establishing working relationships and energy market for distribution within tribal boundaries is possible
- Fort Berthold has Class 5 and 6 wind resources
- The Department of Energy and NREL are supportive and a valuable provider for training, education, technical support, funding vehicle, informational, and patient
- The tribal population is becoming very supportive of wind energy
- Keep everyone informed and process's vary from project to project
- Know a knowledgeable expert consultant who is reliable
- How to follow a schedule and keep developers, consultants, and responsible parties responsible to contracts and reporting obligations.
- That a fair PPA can be obtained with supporting economic data
- That there are various ways to market wind energy, locally and nationally
- Transmission is underdeveloped to transfer and meet future needs
- Development is very expensive
- Meet and created working relationships with various experts in specific areas required to develop economic modeling for wind projects
- It takes time to complete a project based on response time to and fro from preparing a wind feasibility study and various phases for environmental issues.
- Respect everyone and be informed.
- I now have the knowledge from hands-on and training in developing a wind project

Comprehensive Business Plan

Plan was completed under a Model created by Distributed Generations Inc. This model Business Plan is shown in the Description of Activities Preformed

Site-specific renewable resource assessment:

- Provided date from the flow of wind, its speed Class 3 at 40 meters and direction of most consistent flows.
- Provided tribe with data for consultant to establish a economic model to sell the energy and show payback ability

Tribal load assessment and export loads:

- Does not pertain to this project do to size of turbine and turbine power is directed at off-setting cost to Four Bears Casino.

Transmission and interconnection considerations:

- Consultant to the Tribe, Distributed Generations Inc., performed assessment and we evaluated four different systems and eliminated all but one which was hard-negotiated with Basin Electric and its ties to the co-op and their standard Power Purchase Agreement.
- McKenzie Electric Cooperative is the only power supplier located at proposed site.

Technology analysis:

- Provided by consultants and contractors.

Economic Assessment (benefits & impacts)

- Provided by Disgen and assistance from Intertribal COUP
- Provides electric power to off-set costs to Four Bears Casino
- Four Bears Casino is owned and operated by the Three Affiliated Tribes (TAT), which will affect all enrolled members of Fort Berthold.
- Wind Energy Department and Maintenance Department of TAT is in the process of studying off-set costs based on data being received from McKenzie electric and net metering for one year.

Preliminary System Design:

- Was overseen and developed by Disgen and TAT Wind Coordinator which involved parties of: Entegrity Wind, McKenzie Electric, Basin Electric, LHA Engineers, Inc.

Training and other professional development planning:

- Under direction of DOE, NREL administered ongoing training in wind energy and other renewable energy:
  - Certificate Training – 101
  - Certificate Training – 102
- Trainings were also conduct by BIA
  - Certificate for NEPA training

- Other types of training came on the seat of the pants:
  - Hands-on experience
  - Many conference's hosted by Senators
  - Workshops hosted by CERT
  - Workshops hosted by Intertribal COUP

- Fort Berthold Community College Degree
  - Obtained Associates of Science Degree in Energy Technology
  - Learning processes associated with Refining and various Renewable Energy processes.

These trainings will help me and other tribal members with technical knowledge in the Tribal Energy Developments happening on Fort Berthold such as:

- Current Wind Feasibility Study on tribal lands south of Parshall
- Current Wind Feasibility Study east of Twin Buttes on tribal land
- Current Clean-fuels Refinery on tribal lands by Makoti, ND
- Prospects of Coal-fired generation
- Prospects of Ethanol Plant
- Prospects of Coal-gasification Project
- Prospects of Bio-mass Project

Long-term operating and maintenance planning:

- Set up through the Three Affiliated Tribes Maintenance Department.
- Tribal desire to create a Tribally-Owned Utility Service Department.

Business planning for implementing a sustainable renewable energy development project:

- Currently under development of two wind energy farms:

- (1) Tribe with Distributed Generations Inc. is at the end of Phase I assessment.
- Located south of Parshall ND on tribal lands
- Suggesting 30 Mw wind farm
- Preparing to address funding for Phase II assessment and development to Tribal Council
- Class 5 and 6 wind resource
- Land available for much larger project

- (2) Tribe under Resolution as participating in Intertribal Council On Utility Policy project to develop 80 Mw of wind ranches, 10

Mw on eight different reservations between North Dakota, South

Dakota and Nebraska.

- Tribe's location on Fort Berthold is east of Twin Buttes on the most southern portion of the reservation.
- Nearing end of Phase I assessment and preparing for Phase II and development of a 10 Mw wind ranch of larger.
- Wind coordinator in process of identification of tribal load.
- Working with another consultant who may have a good Distribution Model to implement.

(J)

Description/Abstract

The purpose of the Three Affiliated Tribes proposing to Department of Energy was nothing new to Denmark. National Meteorological Studies have proved that North Dakota has some of the most consistence wind resources in the world. The Three Affiliated Tribes wanted to assess their potential and become knowledgeable to developing this new and upcoming resource now valuable.

By the Tribe implementing the Utility-scale Wind Turbine Project on Fort Berthold, the tribe has proven the ability to complete a project, and has already proceeded in a feasibility studies to developing a large-scale wind farm on the reservation due to tribal knowledge learned, public awareness, and growing support of a Nation wanting clean renewable energy. The tribe is working through the various measures and regulations with the want to be self-sufficient, independent, and marketable with 17,000 times the wind energy needed to service Fort Berthold alone.