



Banner Wind, LLC

A joint wind energy project by: Bering Straits Native Corporation

Sitnasuak Native Corporation

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WCE's Approach to Wind Development

- Wind energy can reduce energy costs in Alaska through the supply of long-term, fixed price energy that complements existing diesel-based generation.
- WCE also believes that successful implementation of projects is only the start—the operational phase of each project will either make or break the project's long-term success.
- WCE believes in a "Hub & Spoke" Model that relies on a strong "Hub Project" to operationally support nearby "Spoke Projects".
 - "Hub Project" = Banner Wind Project in Nome
 - "Spoke Projects" = Nearby Village Projects
- WCE fully leverages available US state and federal incentives for maximum benefit.





Project Description

- (18) Entegrity EW-50 wind generators in Nome, Alaska; Bering Straits Native Corporation (BSNC) and Sitnasuak Native Corporation (SNC) as joint owners, with WCE serving as Project Developer.
- Nome received 100% of its power from diesel generation; Project will have a rated 900 kW capacity with a maximum output of 1,170 kW (12 42% penetration).
- Project owners have committed to selling the energy to Nome Joint Utility (NJU) at a fixed or floating price below NJU's avoided cost calculation; revenues will be shared equally between SNC and BSNC.
- Selling the Project's energy at a long-term, fixed rate will provide savings to the utility now and in the future—savings that can be used to lower energy costs for Nome area residents.
- The Project's energy serves as a long-term, fixed price hedge against wildly fluctuating diesel prices.





Banner Ridge from SE viewpoint showing foundation excavations before turbine erection

View of project from Bonanza at North end of project showing excavations and crane at array 5 location







Road building and moving towers around on site





NJU underground 25 kV line extension (grey conduit) and fiber optic line (red conduit) to wind farm





NJU 25 kV line coming off spool and shown in one of many junction boxes







Close-up of bedrock anchor bolts



Bedrock anchor bolts shown for three foundation pads



Leveling the foundation pads





Individual steel foundation leg ("Rocket Body")



Complete set of "Rocket Bodies" pre-backfill







Building the 100', diagonally cross-braced, lattice tower





Wind tower mobilization for assembly and erection sequencing





Flying the generator

Fixing generator to top of tower





Fixing blades to hub using crane

Picking generator with crane for lift

















Backfilling and re-grading turbine foundations; (7) turbines shown from Arrays 4 and 5





Photo of completed Project - 18 turbines





Banner Wind Project Schedule

| Project Activity | Start Date | Finish Date | Status |
|--|------------|-------------|------------|
| Complete Turbine Order | Feb-08 | May-08 | Complete |
| Schedule Shipping Barges | June-08 | Sep-08 | Complete |
| Final Wind Analysis | Jun-08 | Jun-08 | Complete |
| Permitting Start | Jun-08 | Jun-08 | Complete |
| Geotechnical Field Analysis | Jul-08 | Jul-08 | Complete |
| Foundation Design | Aug-08 | Aug-08 | Complete |
| Final Site Design | July-08 | Aug-08 | Complete |
| Construction Start: Roads, Foundations | Sep-08 | Sep-08 | Complete |
| Arrival of Last Barge: Wire, 8 Turbines | | Oct-08 | Complete |
| Turbine Erection | Oct-08 | Oct-08 | Complete |
| Turbine Electrical Wiring | Oct-08 | Nov-08 | Complete |
| Utility Interconnection | Oct-08 | Jan-09 | Complete |
| Turbine Commissioning | Dec-08 | Jan-09 | Complete |
| Final Operations and SCADA Networking | Dec-08 | Jan-09 | Complete |
| Winter Ice Storms: Improvements & Re-Design | Feb-09 | Present | In Process |
| Serial Defect w/ generator drive train tolerance | Apr-09 | Present | In Process |



Cost breakdown



Project Cost: < \$5,000/kW

- Turbine, Tower and Controls
- Construction, Roads, Foundations
- Support Structures, SCADA, O&M Facility
- Electrical Infrastructure
- Wind Turbine Erection, Assembly
- Project Design, Permitting, Consulting
- Utility 25 kV Line Exstension





Rural Development Benefits

- Provides a cash and tax credit based revenue stream to BSNC and SNC, short-term construction and long-term operation and maintenance jobs, and long-term sustainable revenue that can be used to support Village wind projects.
- BSNC has committed to dedicating 50% of its profits from the Project to the development of renewable energy projects in the Villages around Nome.
- WCE has committed to providing service to Village projects by using the Banner Wind Project as an operational service hub over the next 30 years.
- Renewable energy projects in the Villages will ultimately reduce dependency on oil in locations where oil must be flown or barged in, which will help to reduce energy rates.
- The profits from the Project, which are ultimately distributed to the shareholders of BSNC and SNC, will help provide income to an area where many have very limited incomes.

Future Benefits

- Technician Hub Training Center; Wind for Schools
- Region wide development



Some of the Many Lessons Learned

- 1. <u>Data</u>: Developer should be responsible for environmental monitoring to ensure collection of clean, robust wind data and key weather data (moisture, air density, ice, temp, etc.); remote data uplink or chip procedure; need to bring developer in 1-2 years before construction starts.
- 2. <u>Permitting</u>: Initiate regional baseline environmental studies.
- 3. <u>Utility</u>: Immediately begin discussions to identify system-specific electrical design, SCADA and operation issues and to allow for adequate time to bring in the required equipment.
- 4. <u>Engineering & Design</u>: Full vetting of the cold-weather package, with importance placed on additional upgrades (seals, heating elements, sensors, materials etc.)
- 5. <u>Power Purchase Agreement & Interconnect</u>: Developer fully responsible; in-place prior to construction; fair, long-term, industry standard PPAs and Interconnection Agreements.
- 6. <u>Construction</u>: Region wide-crane & equipment support; cost reductions through pre-cast concrete solutions (if applicable); possible to achieve 20% cost savings on next project.
- 7. <u>Operations</u>: Unscheduled maintenance plan; site access; on-call techs; weather windows; sufficient spare part inventories; pre-purchase of spare parts; annual re-supply barges.