

Kotzebue Electric Association, Inc

## Wales Diesel-Off High Penetration Wind System

9/25/2011

Quarterly Project Report

Prepared by: Jesse Logan (KEA)

<b>Total Project Budget</b>	<b>155,000</b>
Denali Commission	155,000
<b>total</b>	<b>155,000</b>

# Wales Diesel-Off High Penetration Wind System

## Kotzebue Electric Association

### Timeline

<b>Phase One-Project Design and Engineering</b>		<b>Start dates</b>
Task 1.1	Create Project Plan KEA AVEC Consultant	1-Jan-10
Task 1.2	Evaluate Existing System-Create Prelim. Report KEA AVEC Consultant	15-Aug-10
Task 1.3	Trip to Wales for Analysis Airfare x 3 KEA AVEC	1-Nov-10
Task 1.4	Construct Preliminary Engineering Design KEA AVEC	1-Feb-11
<b>Phase Two-Installation</b>		
Task 2.1	Procure Equipment Satellite Gear Radio Upgrades Wind Turbine Parts Miscellaneous	15-May-11
Task 2.2 Installation	Wind Turbine Repair Wind Technician	Oct 2011
Task 2.3	Travel Kotzebue to Wales Electrical installation Travel from Anchorage to Wales x 2 KEA AVEC Consultant	Oct 2011
Task 2.4	Final Troubleshooting Travel from Anchorage to Wales x 2 KEA AVEC Travel Kotzebue to Wales KEA Wind Technician	Spring 2012
<b>Phase Three-Data Analysis</b>		
Task 3.1	Review of Past System Performance Consultant	TBD
Task 3.2	3 months of Data Evaluation	TBD

	Data Network Established	
	Ongoing Data Analysis-ACEP	
Task 3.3	6 month Preliminary Report	TBD
	KEA	
Task 3.4	Close out Report	TBD

## **1.0 Current Status of Schedule and Budget**

In June, 2010, KEA contracted Western Community Energy to visit Wales and complete a detailed diagnostic of the two AOC wind turbines. Complete diagnostic details, repairs and recommendations were reported last quarter. As per weather delays and unexpected complications in the turbine operation, the schedule has been altered from the original. KEA now plans to finish the repairs in October of 2011 with final troubleshooting in the spring of 2012.

As reported last quarter the communication system (unexpected issues such as a revolving IP address system used by local telephone exchange) had severely limited the flow of information. Recently there has been damage to the communication antennae mast (shown in Picture 1, below). In order to avoid this in the future, a new piece of rigid conduit will be mounted as well as new yagi antennae and coax cables.

During the summer of 2011 a HughesNet dish was installed at the Wales facility to increase communication (see picture 2, below). There has also been some corrosion and apparent vandalism to the ESS (energy storage system) connex (see picture 3, below). A door will be fabricated to keep vandals away from the ESS entrance door. The door is meant to keep snow away from the ESS door that swings out of the ESS (for emergency egress purposes). A roof hatch is also mounted for emergency egress.

Electrical troubleshooting on the wind and ESS systems showed erroneous power readings (see picture 4, below). These erroneous power readings are possibly caused by new power measuring equipment that was added. The analog current output circuit of each engine power transducer will need to be traced out and verified to be supply power signals to both the new equipment and the WDCP PLC.

As of June 2011 the Wales Diesel-off High Penetration Wind System project is on budget, and the schedule will continue to be weather dependent.

## **2.0 Tasks for Next Quarter**

KEA will continue to work with involved parties on the system designs and control upgrades. In order to gain long term wind and climate data KEA has also been in discussion with AVEC and have opened communications with the Alaska Energy Authority to aid in the placement of a met tower in Wales. AEA has confirmed the

availability of a met tower, which is currently being shipped to Wales. KEA plans to install the met tower in October 2011. Additionally, KEA is evaluating the use of a cell phone data retrieval option. Having updated wind monitoring equipment will give a more complete answer to wind shear and turbulence issues at the wind site.

So far from the review of the wind turbines and the November visit to Wales it appears that the system including the ESS (energy storage system) the controller and the thermal storage units are intact.

Once the system is operational KEA can evaluate the system performance to (1) ensure that there are no significant safety issues and (2) ensure that the system will not damage any of the power plant systems. There are issues with the power plant that need to be understood before any evaluation can be done. KEA will be meeting with AVEC to understand what the issue is, and to determine if there are other potential power plant problems that need to be addressed before the wind/diesel system can be operated. This discussion is ongoing. It will be critical to see the system run in its entirety in order to make recommendations for system upgrades, but it must be done safely.

There will also need to be a discussion concerning the upgrades to the wind turbines. The upgrades that have been recommended will need to be evaluated to determine which will enhance the turbine performance for system testing, and which will need to be deferred. The original grant request anticipated that the turbines were operational with minimum maintenance. The turbines had been repaired approximately 6 months before the grant was submitted, and other than an issue with the speed sensor they could have been operational. Since that repair a number of other significant issues have developed. This has complicated the entire budget outlook as more funding will need to go to the turbine repair than was anticipated. In this case a review of the budget will be needed to see if there are available funds from other categories that could be shifted without affecting the overall outcome of the project.

The main goal of the project is to get the system up and running again.

## **5.0 Tasks to be Completed Next Quarter**

- Reworking of project budget to reflect timeline and changes to system.
- Engineering Design-*ongoing*.
- Evaluate Equipment for: Satellite Gear, Radio Upgrades, Wind Turbine Parts, Misc.- *ongoing*.
- Installation of a met tower.
- Installation of Skystream wind turbines.
- Teleconference with AVEC controls engineers to discuss diesel control issues.
- Site visit to Wales to install repair parts and further troubleshoot communications and controls.
- Provide training to WDCP to new Wales plant operator.
- Repair power connection to school dumpload.

## **6.0 Conclusion**

Currently the wind-diesel hybrid power system in Wales is not functional. Based on observations from Matt Bergan and ACEP staff, and talking with Bill Crisci, the hybrid wind-diesel control system is still functional. Bill still uses the wind-diesel control to switch engines however there are some issues with the paralleling gear in the AVEC switchgear that is causing him some headaches. This will need to be evaluated as it pertains to the rest of the project.

Additionally, the battery connex (ESS) has been kept warm and the batteries are still full of water, though they are probably due for a cycle charge before re-commissioning.

## **7.0 Pictures**



**Picture 1: Damaged communication antennae mast**



**Picture 2: Control connex with newly mounted HughesNet satellite internet dish.**



**Picture 3: Corrosion and vandalism to ESS entrance.**



Picture 4: Erroneous electrical readings.