



**Iowa Tribe of Oklahoma's
Assessment of Wind Resources on Tribal Land
DOE's Tribal Energy Program Review
March 24-27, 2014 - Denver, CO**



Overview

- Iowa Tribe of Oklahoma
- Iowa Tribe Long Term Energy Vision
- Historical Renewable Energy Timeline
- Project Objectives
- Wind Study Reports
- New Location Update
- Changes and Challenges
- Next Steps and Final Report



Iowas Tribe of Oklahoma

- Tribal enrollment is over 780
- Organized under the Oklahoma Indian Welfare Act, which authorized the adoption of a tribal constitution, by-laws and a Business Committee
- Strong Commitment to Energy Efficiency & Renewables, Environmental Stewardship
- Largest employer in the area with 2 casinos, smoke shop, RV park, art gallery/gift shop and tribal government employees



Bah-Kho-Je Meaning

- “People of the Grey Snow” in loway language
- It derives its meaning from a translation over many decades passed down from our “Old People” through our oral history
- The fire-smoked grey snow covered villages in the winter
- The state of Iowa takes its name from the Bah-Kho-Je people



Business Committee 2014

Gary Pratt
Chairman

Bobby Walkup
Vice Chairman

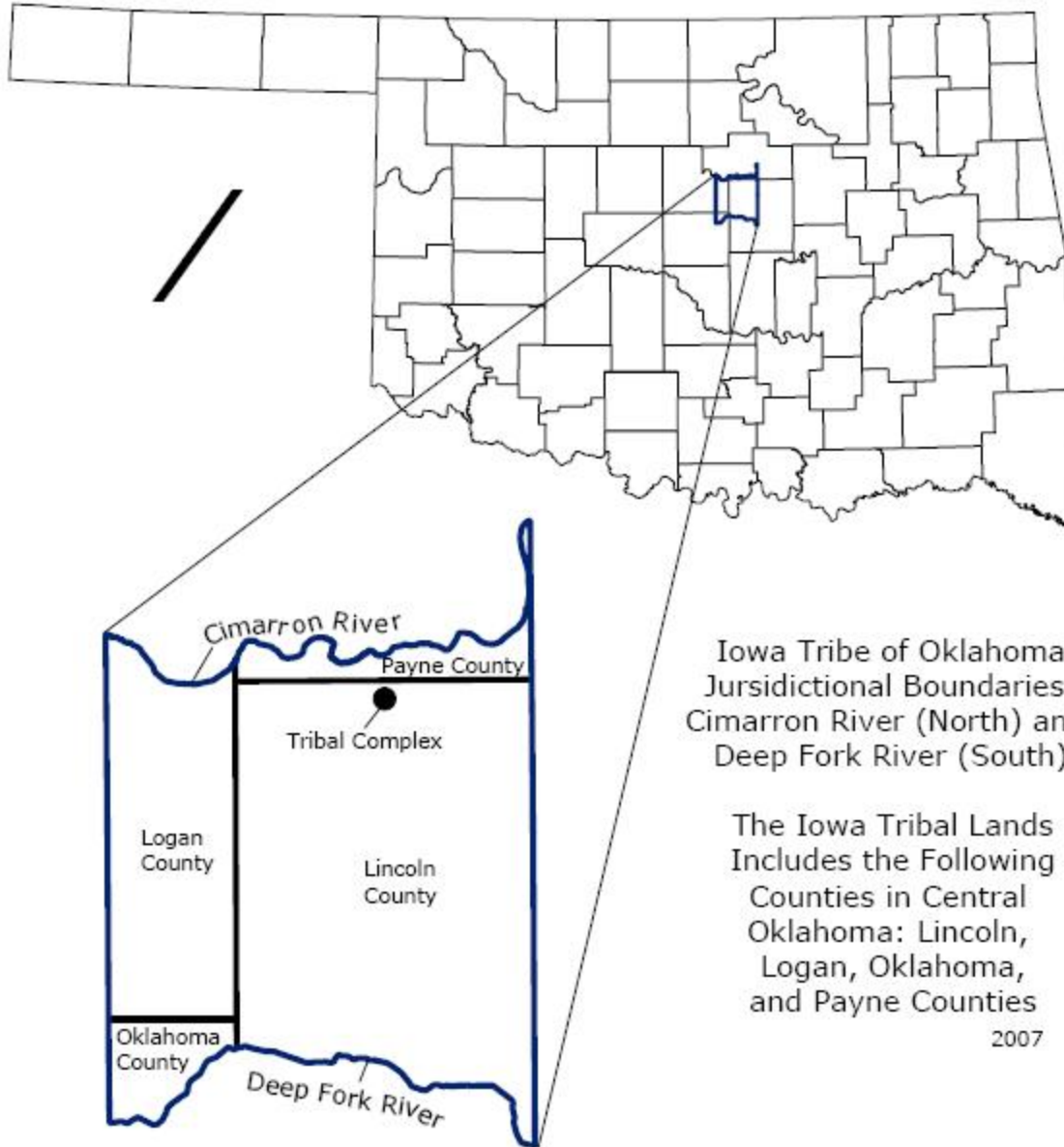
Lisa Switch
Treasurer

Leslie Tanyan
Secretary

Renee Prince*
Councilperson



Iowa Tribe of Oklahoma's Traditional Jurisdictional Lands



Iowa Tribe of Oklahoma
Jurisdictional Boundaries:
Cimarron River (North) and
Deep Fork River (South)

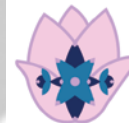
The Iowa Tribal Lands
Includes the Following
Counties in Central
Oklahoma: Lincoln,
Logan, Oklahoma,
and Payne Counties

2007



Michelle L. Holiday

- The founder and president of Michelle Holiday and Associates, a Native woman-owned consulting company specializing in tribal energy and economic development, stakeholder relations, government relations/federal affairs, permitting and siting transmission projects, public affairs and communications, project management, and strategic planning
- Over 20 years of industry experience working for Edison International and Southern California Edison
- A new career direction as a consulting company but long term commitment working with and for tribes on energy matters
- Tribal member, former Tribal Development Director, 2000-2002, Tribal Representative with 4 prior Administrations
- Worked on the DOE Native American Anemometer Loan Program in 2001



MHA
MICHELLE HOLIDAY & ASSOCIATES

Iowas of Oklahoma's Long Term Energy Vision

- Energy Self Sufficient
 - Core to Economic Development
 - Environmental Philosophy
 - Sustainable Energy Development Model
 - Resource Development
 - Renewables Wind and Solar
 - Land, Oil, & Minerals
 - Energy Efficiency
 - EPA Grant
 - Lighting Retrofits & Motion Sensors



TIMELINE IOWA TRIBE WIND RESOURCE ASSESSMENT

5 Years

2010

2011

2012

2013

2014

DOE Awarded Grant
April 2010-December 31, 2011

Modification 1
Extended Project Period to June 30, 2012
Project Relocation to Site 2
Equipment Malfunction Site 1
NEPA Review/Approval
Contract Approval
Budget Justification
MET Tower Height Change

Modification 2
Extended Project Period 6/30/13

Tribal Complex Site 2
February, 2013 Relocation
MET Tower and SODAR Unit
Maintenance Issues

Resource and Energy Production
Report-Wind and Solar Analysis
March 27, 2013

Wind Study Report
Fallis Location June 30, 2013

CREC Energy Analysis
Small Wind Assessment
April, 2014 Pending

Final Report Due
June 31, 2014

Request Modification 3
Budget Justification
Business Plan April, 2014



Site



Grant Mods



Future Activities

Statement of Project Objectives

The overall objective of the Assessment of Wind Resource on Tribal Land project is to conduct a wind resource assessment in order to quantify the wind resource potential available on the Iowa Tribe's land. This information will be used to develop a commercial scale wind farm or distributed generation application, which will allow the Tribe to be energy independent and offer an additional revenue stream.

- **Objective 1:** Identify and address technical issues concerning wind energy development
- **Objective 2:** Conduct an in-depth feasibility study of wind energy to evaluate the actual value of wind
- **Objective 3:** Identify and address environmental issues concerning wind energy development and educate stakeholders about challenges of implementation



Lessons Learned From November Program Review 2012

- Find the Best Area to Place Met Tower
 - Land
 - Use Existing Wind Data
 - Transmission Opportunities
- Use a Redundant System
 - SODAR with Met Tower is a Great Combination
 - Data Correlation / Redundancy
 - Avoids Collection Disasters (Logger & SODAR)

Find the Best Resources

- Hire Expertise to Avoid Future Headaches



SOPO Tasks Executed

5 out of 8

- ✓ 1. Conduct a wind resource assessment: micrositing of met mast, purchase, install, and manage wind data collection at up to 200 Meters with a 60 meter anemometer and SODAR unit. (Completed for Site 1 with SOPO modification and budget to continue on Site 2)
- ✓ 2. Collect data for a 12-month period, 8,760-hours. (Completed for Site 1 only with SOPO, NEPA and budget modification)
- ✓ 3. Data collection, data verification and certification; such verification procedures are required for negotiation of power purchase agreements and as collateral for financing. Data will be verified on a weekly basis by a certified meteorologist. (Report data does not support pursuing this task)
- ✓ 4. Data analysis to determine the feasibility of constructing a commercial scale wind energy project-completed to offset local and distributed electrical loads and sell the excess power back into the grid.
(Report data does not support pursuing this task)
- ✓ 5. Economic assessment for wind turbines that would be sited on tribal lands based on wind data and wind turbine performance data. (Completed for Site 1 for commercial scale. Site 2 assessment under review for small scale wind development)

Wind Study Report

Energy Assessment Key Findings

Location: Fallis

- The wind resource in the vicinity of the installed met mast near Fallis is not rigorous enough to support a commercial wind project.
- The wind resource in the new proposed project area is a class III, low wind resource. The wind resource is in the outer bounds of feasibility and the economics will be driven largely by the achievable power price for the project.
- A high degree of uncertainty regarding the wind resource exists at the proposed site and additional on-site information should be obtained to verify the projections of the report.
- 11 consultants prepared the extensive wind study report

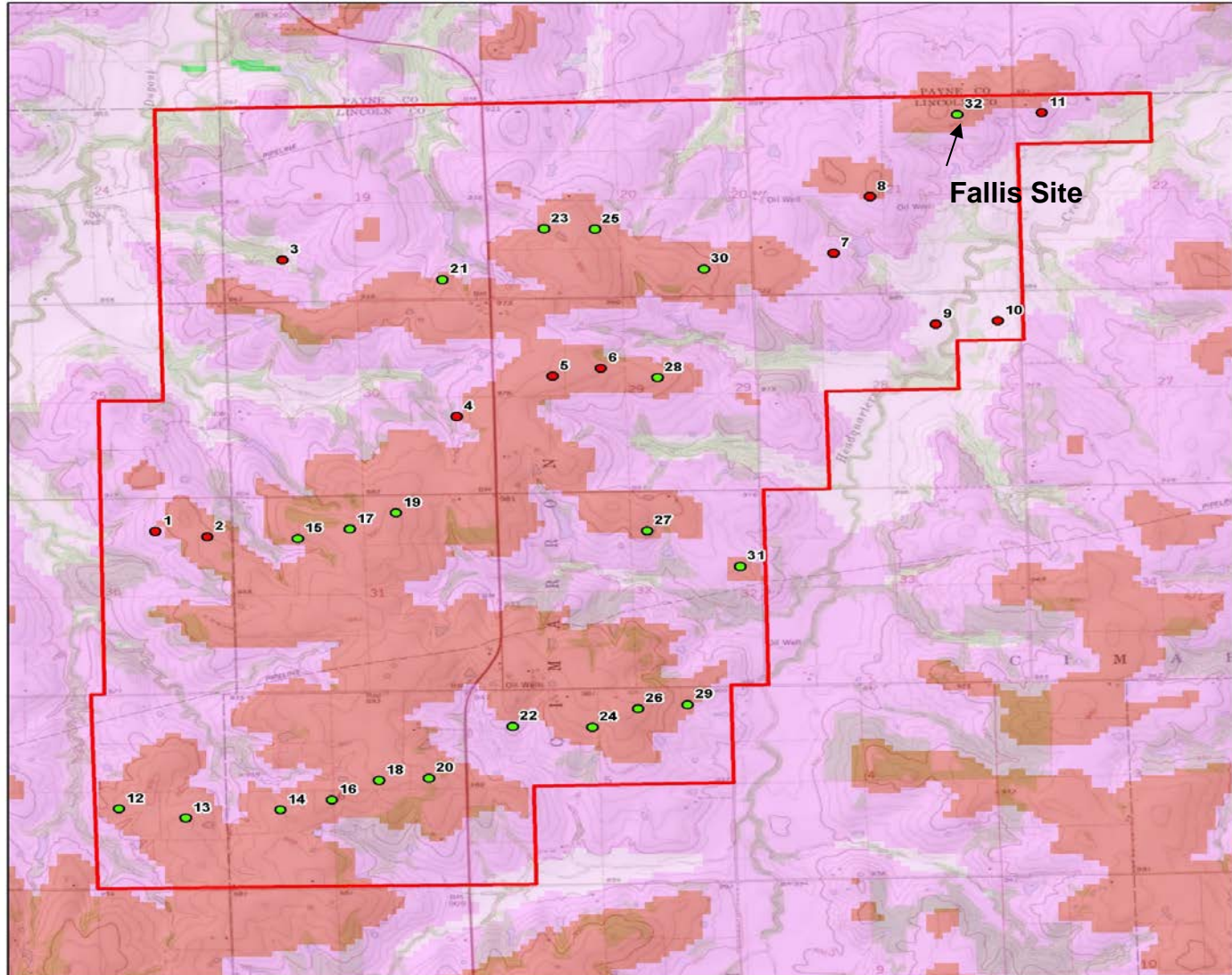


Resource and Energy Production Report

Location: Fallis

- Energy Production Summary Completed March 27, 2013
AWS Truepower/Johnson Controls
- Installation and data collection of MET tower to access wind and solar to estimate the energy production potential, and design considerations beginning November 2011
- Based assessments on existing modeling for estimated wind energy production concluded from the data the average annual net production and capacity factor for the project was 58.4GWh and 37.4%, respectively
- Two sites, mean annual wind speed at 96 meters
- Site 32 on tribal land

Proposed Turbine Layout Phases 1&2, Site 32



IOWA TRIBE OF OKLAHOMA
PROPOSED TURBINE LAYOUT
PHASES 1 & 2

GE 1.6 - 100 Turbine		Mean Annual Speed at 96 m	
● Phase 1	● Phase 2	< 5.75	< 12.9
● Phase 1	● Phase 2	5.75 - 6.00	12.9 - 13.4
● Phase 1	● Phase 2	6.00 - 6.25	13.4 - 14.0
■ Project Area			

<p>Product</p> <p>EPS</p> <p>Disc/Water</p> <p>This map was created by using Topographic™ using the Standard System and National Weather Service 2010 Data. Turbine™ 11.7.11.01 (Copyright)</p>	<p>Reference</p> <p>0 0.25 0.5 0.75 1</p> <p>0 0.1 0.2 0.3 0.4</p> <p>North Arrow</p> <p>Originator</p>
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Changes and Challenges

Location Changes

- 1st Site Location (Fallis)
 - Vandalism of SODAR Unit
 - Wires cut and battery converter stolen
 - Repair and Relocated
- 2nd Site Location
 - (Tribal Complex)
 - Data collection from the SODAR Unit not recording for approx. **7 months**
 - Battery Pack Inoperable
 - Weather Sensor Not Replaced
 - Modem not transmitting data

Human Resources Issues

- Tribal Capacity Issues
 - Lack knowledge transfer
 - Significant delays
- Employee Turn Over
 - 2 initial employees managing the wind project no longer work for the tribe
 - 4 months delay and fact finding review and assessment conducted
 - New tribal project team formed with energy consultant in August 2013



Location of Selected Wind Turbine

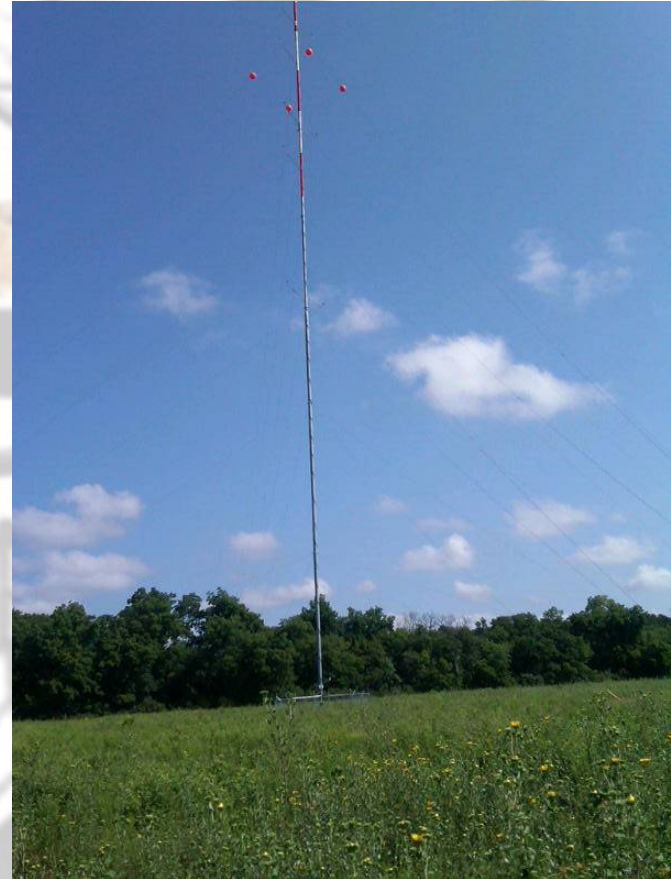
Small Scale Wind Development near the Iowa Tribe of Oklahoma's Tribal Complex in Perkins, Oklahoma

Longitude and Latitude coordinates (35.929130, -97.024637)



IOWAS OF OKLAHOMA

MET Tower



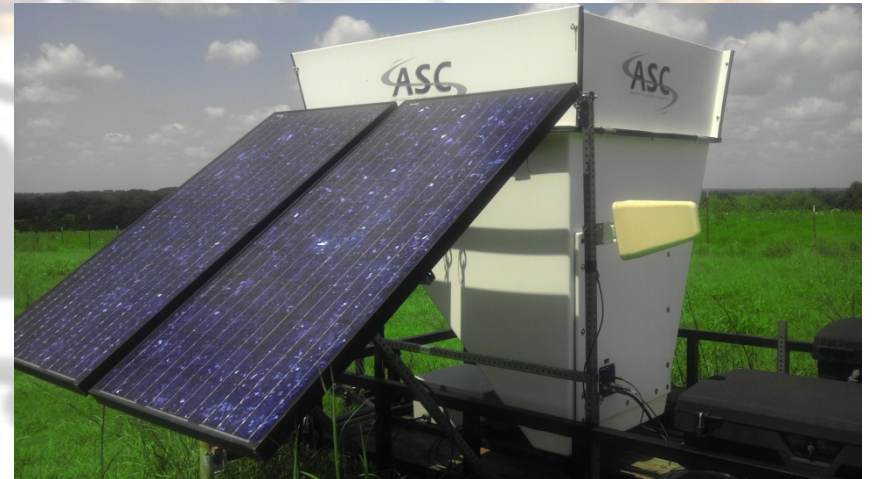


ASC SODAR Unit
Solar Panels and Battery Packs



IOWAS OF OKLAHOMA

SODAR Solar Panels



LOWAS OF OKLAHOMA

SODAR Unit



Next Steps for SOPO Completion

- The Iowa Tribe's energy team will work closely with the DOE to amend the modification to the Scope of Project Objectives: 6, 7 and 8 and include additional action items to complete the business plan.
- 6. Environmental assessment for cultural resources, natural resources and avian considerations that may be impacted by wind turbines' noise and visibility. Work cooperatively with the Iowa Tribe's Office of Environmental Services (OES) to obtain all necessary FAA and environmental permits and approvals.
- 7. Completion of business plan and model ready for submission to potential lenders.
- 8. Obtain letters of intent from local utilities for the sale of excess energy.
- Additional items to include in the modification and revised costs for the budget justification:
 - MET Tower Removal
 - SODAR Data File Transfer
 - Energy Analysis and Recommendations



Removal (1) 60m XHD Tower

- The Scope of Work includes the following:
- Transportation of Techs
- Transportation (mileage) of Crew/Installation Equip to Site
- Rent of Skid Steer
- Fastening materials (nuts, bolts, hardware, tape)
- Per Diem for techs
- Lodging accommodations for Techs
- Project Management Fee (per tower)



SODAR Data Files Transfer

Anemometry Specialists agrees to transfer data files for (1) ASC Sodar to the IOWA Tribe

Transfer Files Include:

- Raw Wind Data Files for Period of Record in Native Format
- SoDar Commissioning Form (From Original Commissioning)
- Maintenance Records (If Performed by ASI)
- Any Available Photos
- Most Recent Data Files



CREC/SES Energy Assessment

- Central Rural Electric Cooperative/Smart Energy Source
- Scope of Services
 - Assist in the analysis of electric wind generation equipment in regard to economic viability.
 - Provide an analysis of the electric load from tribal accounts with a detailed list of service points and buildings associated with each electric meter.
 - Provide analysis based on utility interconnection agreement options.



Cont. CREC Energy Assessment

- Scope of Services
 - All electric, natural gas, propane, water and sewer consumption
 - Thermal characteristics of the building **development**
 - Lighting
 - Heating ventilating and air condition systems
 - Water heating
 - Appliances
 - Specialty equipment

CREC/SES Deliverables

- Energy Assessment
 - A comprehensive tool designed to empower the Iowa Tribe to make informed decisions about energy use and implement energy efficiency measures.
- Energy Efficiency Recommendations
 - This report identifies the energy efficiency options recommended by SES Energy Professional. These recommendations are intended to help the Iowa Tribe to achieve its energy efficiency objective of reducing overall energy use.

Final Report

- 90 Day Plan
- Receive Approval to Proceed with Revised Modification of the Scope of Project Objectives
- Conduct Environmental Assessment
- Review Energy Analysis of the Iowa Tribe's Account Information
- Prepare Final Report with Recommendations

