Final Technical Progress Report

Project Title: “Tennessee Valley and Eastern Kentucky Wind Working Group”

Covering Period: December 1, 2009 to November 30, 2011

Date of Report: February 28, 2012

Recipient: Southern Alliance for Clean Energy

Award Number: DE-EE0000516

Working Partners: Tennessee Valley Authority, East Kentucky Power Cooperative, State of Tennessee Department of Environment and Conservation, State of Kentucky Energy and Environment Cabinet, Appalachian Regional Commission

Cost-Sharing Partners: TVA, EKPC

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Project Objective

The goal of this project is to coordinate and build upon the efforts of utility, state, and regional interests to expand into a regional wind working group, to be known as the Tennessee Valley and Eastern Kentucky Wind Working Group. This goal was achieved through 1) providing analytical and reference tools to regional utilities; 2) facilitating state and regional collaboration through the creation of the TVEKWWG; 3) conducting market research and developing planning activities specific to the Tennessee Valley Authority and East Kentucky Power Cooperative service territories; 4) providing technical assistance to states on policy options specific to state permitting structure; 5) identifying, analyzing and sharing best practices in promoting the acceptance of wind energy with local communities; and 6) conducting outreach to electric utilities.

Background

The TVEKWWG expanded on the previous efforts of the Tennessee Wind Working Group. The new group focused on a broader region and partnered directly with utilities, state government agencies, and local governments in order to break down market acceptance barriers to the significant expansion of wind energy within the region. As part of TVA's Green Power Switch Program, 29 megawatts of wind energy has been developed in Tennessee since 2004. The Tennessee Valley Authority (TVA) and East Kentucky Power Cooperative (EKPC) both released a Request for Proposals for renewables in 2009. Wind energy has the potential to contribute to the electricity portfolios of both utilities. In order to ensure industry interest, however, there must be a predictable, sustainable market. Existing barriers to this market include a lack of policy, unclear understanding of permitting at the state and local levels, lack of wind resource understanding, and the need for education at the state and local levels.

Southern Alliance for Clean Energy received notice of the award May 5, 2009, and received the executed award from DOE on December 1, 2009.

Overview

In December 2009, the Southern Alliance for Clean Energy (SACE), through a partnership with the Appalachian Regional Commission, EKPC, Kentucky's Department for Energy Development and Independence, SACE, Tennessee's Department of Environment and Conservation, and TVA, and through a contract with the Department of Energy, established the Tennessee Valley and Eastern Kentucky Wind Working Group (TVEKWWG).

TVEKWWG consists of a strong network of people and organizations. Working together, they provide information to various organizations and stakeholders regarding the responsible development of wind power in the state. Members include representatives from utility interests, state and federal agencies, economic development organizations, non-government organizations, local decision makers, educational institutions, and wind industry representatives. The working group is facilitated by the Southern Alliance for Clean Energy.

TVEKWWG supports the Department of Energy by helping educate and inform key stakeholders about wind energy in the state of Tennessee.

TVEKWWG Members

Members of the TVEKWWG met either in person or by phone at least six times each year. Subcommittees were formed based on topic: utility-scale wind, distributed wind, and community outreach.

TVEKWWG Partners			
<u>Name</u>	<u>Organization</u>	<u>Name</u>	<u>Organization</u>
Brandon Blevins	Southern Alliance for Clean Energy	Jeff Brandt	Eastern Kentucky Power Cooperative
Rick Carson	TVA	Ray Daffner	Appalachian Regional Commission
Kelly Frey	Dickinson Wright	Gil Melear-Hough	Restoration Services, Inc.
Cam Metcalf	Kentucky Pollution Prevention Center	Neil Placer	Tennessee Valley Authority
Kate Shanks	Commonwealth of Kentucky	Katie Southworth	State of Tennessee
Katie Stokes	Southern Alliance for Clean Energy	Fernie Williams	East Kentucky Power Cooperative

Workshops

TVEKWWG held six workshops over the course of the contract:

March 24, 2010 - Knoxville, Tenn.

At this meeting of key wind energy stakeholders from Tennessee and Kentucky utilities and state offices, Dwight Bailey, National Energy Technology Laboratory, introduced DOE's 20% Wind Energy by 2030 Program; Larry Flowers, National Renewable Energy Laboratory, informed the group about the Wind Powering America program; Jeff Reinkemeyer, Iberdrola Renewables, discussed wind siting issues, and Bob Zavadil, EnerNex Corporation, explained the Eastern Wind Integration and Transmission Study.

August 25, 2010 - Morristown, Tenn.

TVEKWWG held a workshop with a focus on renewable energy and workforce development to inform the community of Morristown, TN of the green jobs and educational opportunities that are available in and around Tennessee.

Katie Stokes, TVEKWWG Coordinator at the Southern Alliance for Clean Energy, began the workshop with an introduction to the Department of Energy's 20% Wind Energy by 2030 initiative; Lauren Steier, Southern Alliance for Clean Energy, detailed the growth of the solar industry in the state; Rick Carson, Tennessee Valley Authority, explained to the audience the technology and siting best practices for solar and small wind energy systems; Brian Thomas, VP of Sales for the Wind Group of Barnhart, gave a presentation on the wind farms Barnhart has constructed across the country, including Invenergy's Buffalo Mountain wind farm in Oliver Springs, Tenn.; Andy Aarons, an electrical engineering instructor at Walters State Community College, spoke to the group about the work he is beginning on a degree program which will include courses on solar, wind, and biomass energy; and Marcus Taylor, a research assistant and graduate from Appalachian State University's Appropriate Technology Program spoke on App State's workshops on renewable technologies including small wind, micro-hydro, biodiesel, solar PV, and solar thermal.

November 17, 2010 - Berea, Ky.

TVEKWWG partnered with the Kentucky Renewable Energy Consortium to hold the Economic Development Forum on Renewable Energy in Kentucky on the campus of Berea College. A total of 68 attendees from a variety of backgrounds brought their perspectives on the opportunities and challenges of building a renewable energy economy in Kentucky. The Kentucky Department for Energy Development and Independence and Energizing Kentucky were also co-sponsors.

The forum successfully presented an informative and comprehensive look at how renewable energy business and research partnerships, funding opportunities and workforce development could benefit the Commonwealth of Kentucky by attracting investments and creating "green jobs" as we make the transition to a clean energy economy.

Speakers included Dr. Larry Shinn, Berea College President; Dr. Len Peters, Kentucky Cabinet Secretary for Energy and Environment; Dr. Kimberly Jensen and Dr. Chad Hellwinkle from the University of Tennessee and the national 25x25 Alliance; Kate Shanks from Kentucky's Department for Energy Development and Independence, Division of Renewable Energy; Danny Isaacs, Mountain Association for Community Economic Development; Jeff Brandt, Manager of Alternative and Renewable Fuels, East Kentucky Power Cooperative; Greg Faulkner from the Appalachian Regional Commission; Andy McDonald, Director of the KY Solar Partnership; Eastern Kentucky University's Center for Renewable and

Alternative Fuel Technologies Director Dr. Bruce Pratt.

June 28, 2011 - Webinar: Better Understanding the Southeast's Wind Resource

To meet the need for better understanding of the Southeast's wind resource, TVEKWWG hosted a webinar on the topic. The webinar was a success with over 100 registrants and more than 60 in attendance for the live viewing. Dr. Michael Brower, Chief Technical Officer of AWS Truepower explained the development and use of AWS Truepower's 80-meter state wind resource maps and Daniel Ancona, Vice President for Renewable Energy for Princeton Energy Resources International, spoke about his research on wind shear and boundary layer flow.

July 6, 2011 - Sewanee, Tenn.

After installing wind measurement equipment on their campus, TVEKWWG held a meeting with University of the South sustainability students. Katie Stokes and Reggie Miller, both from the Southern Alliance for Clean Energy lead a group discussion about the wind measurement on campus through the Tennessee Anemometer Loan Program, wind energy technology, and local and federal renewable energy policy.

August 27, 2011 - Oliver Springs, Tenn.

Student leaders from across the Tennessee Valley met to tour the Buffalo Mountain wind farm, a 29 MW wind farm in Tennessee. Katie Stokes, Southern Alliance for Clean Energy and Rick Carson, Tennessee Valley Authority, led the tour of over 50 students and gave presentations on wind energy technology and policy.

Documents

Will Wind Energy Work for Me?

TVEKWWG's Distributed Wind Subcommittee prepared a pamphlet to share best practices and localized information for Kentucky and Tennessee residents, businesses, and organizations. The guide covers the basics of small wind: wind resource, turbine siting, and economics.

Tennessee Valley and Eastern Kentucky Wind Energy Barriers and Strategies

The Tennessee Valley and Eastern Kentucky Wind Working group has found that Tennessee and Kentucky can contribute to the Department of Energy's 20% Wind Energy by 2030 scenario. However, both states will have to overcome several barriers in order to reach their roles in the scenario. This report analyzes the primary barriers to the region including a lack of renewable portfolio standards, relatively low costs of electricity, unstable incentive programs and relatively higher costs of turbine installation on ridgetops. It also discusses how innovative rate programs, loan programs for developers and manufacturers, and consistent policies can help alleviate some of the barriers to wind energy development.

Tennessee and Kentucky Model Wind Ordinance

TVEKWWG members developed a model wind ordinance to share with counties and local governments. The model ordinance is a guide for local policy makers to attract and prepare for responsibly sited utility-scale wind energy developments.

The Growing Wind Industry in Tennessee and Kentucky blog series

During the summer of 2011, SACE published a series on the Clean Energy Footprints blog highlighting the economic impact wind energy already has on Southern States and how each state can benefit, according to the DOE 20% Wind Energy by 2030 report. Tennessee and Kentucky were both featured in the series, including a list of businesses in each state that provide products or services to the wind industry. The series highlighted the fact that despite having only one wind farm in the Southeast currently, the region is on its way to be a leader in wind energy manufacturing and services for the entire nation.

Technical Assistance Program NREL Report

TVA, TVEKWWG, and the state of Tennessee initiated a Technical Assistance Program (TAP) request to investigate further the potential for non-ridgetop wind energy development in the region. Through the TAP, the National Renewable Energy Laboratory (NREL) provided technical assistance to identify candidate areas for future wind monitoring in the central and western part of the TVA service area (primarily Tennessee, southern Kentucky, and northern Alabama and Mississippi).

NREL determined that useable wind resource for development may be available at 80 meters to 100 meters above the surface in the central and western part of the TVA service region. Previous resource maps (wind power class) at 50 meters above ground did not show useable resource in this region.

The following map highlights the areas recommended based on wind resource and relatively low surface roughness.

Anemometer Loan Program

The Southern Alliance for Clean Energy was able to monitor wind speeds at three locations during the grant contract: Johnson City, Tenn., Fall Branch, Tenn, and Sewanee, Tenn.

Lynda Hughes Lumber Co. in Fall Branch, TN

In Fall Branch, TN, sitting atop a well exposed 2,000-foot ridge, the Southern Alliance for Clean Energy monitored the wind resource for Lynda Hughes Dawson Lumber Company. A traditional East Tennessee company, this sawmill uses large amounts of energy to perform its day-to-day operations.

The company reached out to Southern Alliance for Clean Energy to ask about the potential of a wind turbine to offset some of the power usage. The project at the Lumber Co. was installed before this grant award; however, through this grant contract, the Southern Alliance for Clean Energy was able to maintain the anemometer tower, continue to measure wind speeds at the location, and assist the company in understanding the potential for wind energy at no charge to the lumber company.

Buffalo Mountain in Johnson City

The Southern Alliance for Clean Energy, in partnership with the city of Johnson City, monitored the wind resource atop Buffalo Mountain, a nearly 3,300-foot mountain that overlooks the city of Johnson City. The monitoring equipment to test the wind resource was placed atop a city owned cell phone tower by Knoxville, TN based Integration Technologies, LLC, a certified tower climbing company who specializes in electric and communications integration. Testing equipment was placed at different heights on the cell phone tower, and the equipment faced the western side of the mountain to mitigate significant shadowing of the wind resource assessment.

University of the South in Sewanee, Tenn.

In the summer of 2010, The University's Sustainability Director contacted the Southern Alliance for Clean Energy about studying the feasibility of a wind turbine to generate energy for the campus.

In a meeting between the University, representatives from TVA, the local power distributor Duck River EMC, and SACE, wind maps were compared with university-owned property. A location with a 110 foot-tall communications tower was chosen.

After permission to use the communications tower was granted, Duck River Electric Membership Corporation generously agreed to perform the installation. Duck River EMC also hired Johnson Crane Services to bring a bucket truck with a boom long enough to reach above the tower.

The results will help the university make an informed decision on whether wind energy is right for the location.

Website Development

TVEKWWG obtained the rights to the domain names, <http://www.tennesseewind.org> and <http://www.kentuckywind.org> to serve as a virtual server to host information pertaining to wind energy and policies specific to both states.

TVEKWWG Website Resources:

- Monthly newsletters
- Wind energy information
- 20% Wind Energy by 2030 information
- Policies and incentives for distributed wind
- Anemometer loan program data
- Archived workshop presentations
- TVEKWWG completed reports

Conclusion

The Southern Alliance for Clean Energy believes that the development of the Tennessee Valley and Eastern Kentucky Wind Working Group has leveraged individual state efforts and developed activities that will advance the deployment of wind energy.

Communication was opened between both states and utilities. The community, state offices, and utilities now have the most up-to-date information on energy technology and on how to access their wind resources. Barriers to developing wind energy in the region were identified, analyzed and addressed with suggested strategies.

Project Schedule and Milestones

Award No. DE-EE0000516

Task Number	Title or Brief Task Description	Task Completion Date				Progress Notes
		Original Planned	Revised Planned	Actual	Percent Complete	
1	Detailed Work Plan and DOE Approval	Oct-09	Dec-09	Dec-09	100%	
2	Order new anemometer equipment	Jul-10	Jan-11	Jan-11	100%	
3	Install meteorological tower and equipment	Sept-10	Feb-11	Feb-11	100%	
4	Participation from SACE and utility members in 2010 AWEA WINDPOWER conference and WPA All States Summit	May-10		May-10	100%	
5	Participation from SACE and utility members in 2011 AWEA WINDPOWER conference and WPA All States Summit	May-11		May-11	100%	
7	Regional webinar participation	Apr-10		Apr-10	100%	
8	Regional webinar participation	Apr-11		N/A	0%	No regional webinar was held in 2011.
9	Develop wind working group subcommittees	May-10		Apr-10	100%	
10	Development of Tennessee Valley and Eastern Kentucky Wind Working Group website to serve as a database of wind energy information for the region	Jun-10	Jul-10	Jul-10	100%	
11	Hold a total of six workshops targeted at local governments and officials	Oct-11		Aug-11	100%	
12	Run through a mock wind energy proposal with state and regulatory agencies and identify barriers to wind development	Oct-11		Oct-11	100%	
13	Begin market research report	May-10	Jul-10	Jul-10	100%	
14	Develop planning activities for states and utilities to responsibly develop wind energy market	Oct-11		Oct-11	100%	
15	Develop report on suggested processes for streamlining wind energy permitting process and present it to appropriate state agencies	Oct-11	Feb-12	Feb-12	100%	
16	Final market research report	Oct-11		Oct-11	100%	