

DOE-EPRI Wind Turbine Verification Program

In 1992, the EPRI and the U.S. Department of Energy (DOE) initiated the Utility Wind Turbine Verification Program (TVP). The overall purpose of the Program is to provide a bridge from utility-grade turbine development programs underway to commercial purchases of wind turbines. The general approach is to evaluate prototype advanced wind turbines at several sites developed by U.S. electric utility companies.

EPRI manages the Program on behalf of the sponsors, and the Program is funded through contributions from U.S. DOE, the host utilities, and EPRI. EPRI and the National Renewable Energy Laboratory (NREL) provide technical support to the TVP projects via the TVP support contractor, Global Energy Concepts. [Figure 1](#) summarizes the Program organization and the current participants.

The goal of the Program is to facilitate development and installation of utility wind projects in order to both help utilities get wind power experience, and build and operate enough candidate turbines to obtain statistically significant operating and maintenance data. Specific objectives include:

- Verify the performance, reliability, maintainability, and cost of new wind turbine designs and system components in a commercial utility environment.
- Provide states, utilities, and other stakeholders with a valid opportunity to test and evaluate wind power in new areas.
- Document and communicate the experience from these projects for the benefit of utilities, independent power producers, other nonutility generators, landowners, wind turbine suppliers, and others in the wind power development community.
- TVP III: Assess the applicability and value of the distributed wind turbine project model for U.S. power market conditions expected during the next ten years.

As of April 1999, there are seven active and three pending wind projects participating in the TVP program. [Figure 2](#) shows the active project locations, and [Table 1](#) presents design and status information for each of the projects. The projects represent a range of utility types, turbine designs, and geographical and distribution system characteristics.

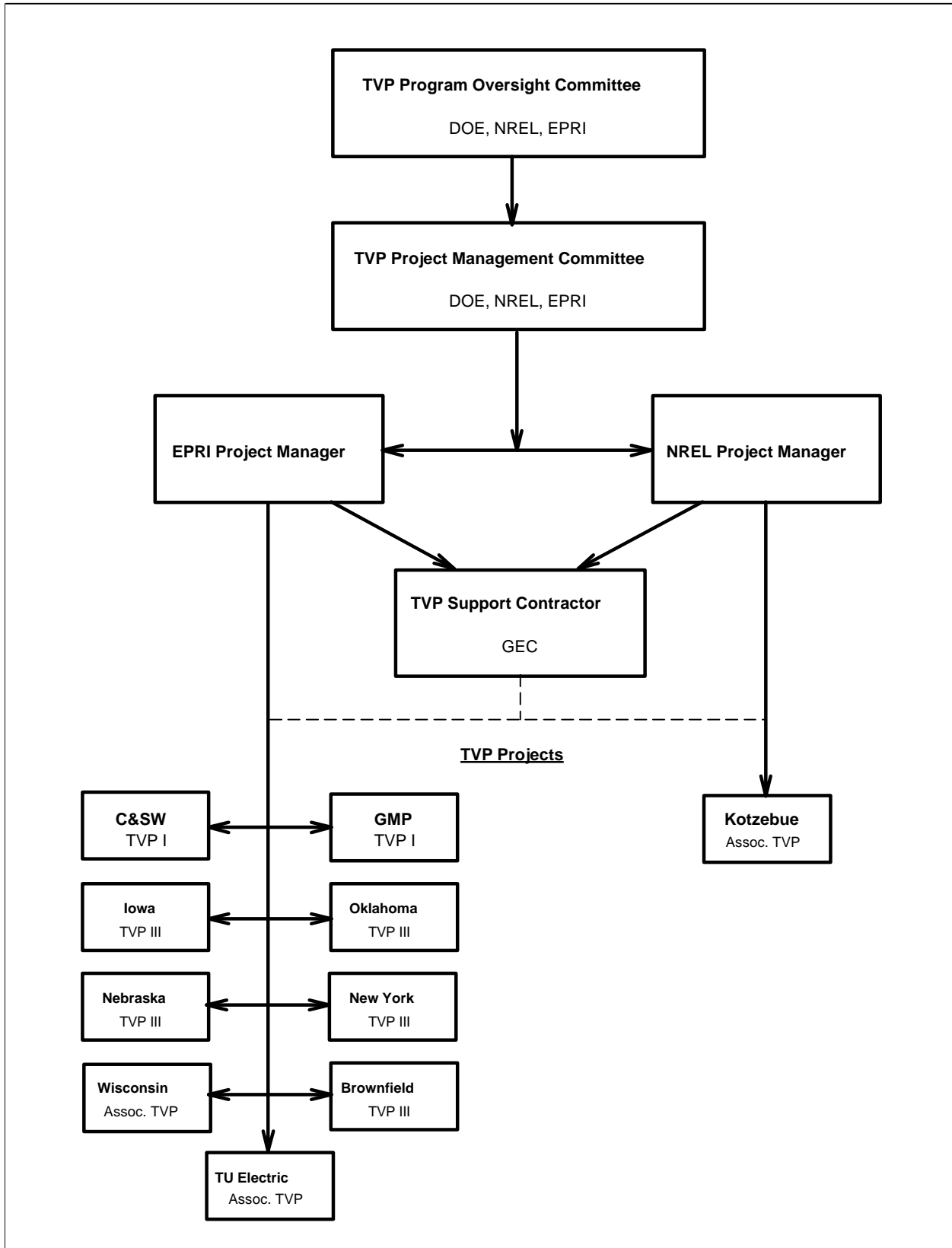
The first two TVP projects are the 6.0 MW project installed in 1995 by Central and South West Services in Fort Davis, Texas; and the 6.1 MW project installed in 1996 by Green Mountain Power Corporation in Searsburg, Vermont.

Most existing U.S. wind power plants are made up of large numbers of turbines at a single site, where operation and maintenance services are provided from a nearby facility, and the power collection system requires a substation and transmission line interconnection. In the current business environment, which is driven by low-cost surplus power and uncertainty about restructuring, distributed wind plants composed of “clusters” of wind turbines connected directly to the distribution system offer power providers more flexibility and lower risk avenues to participate in wind energy projects.

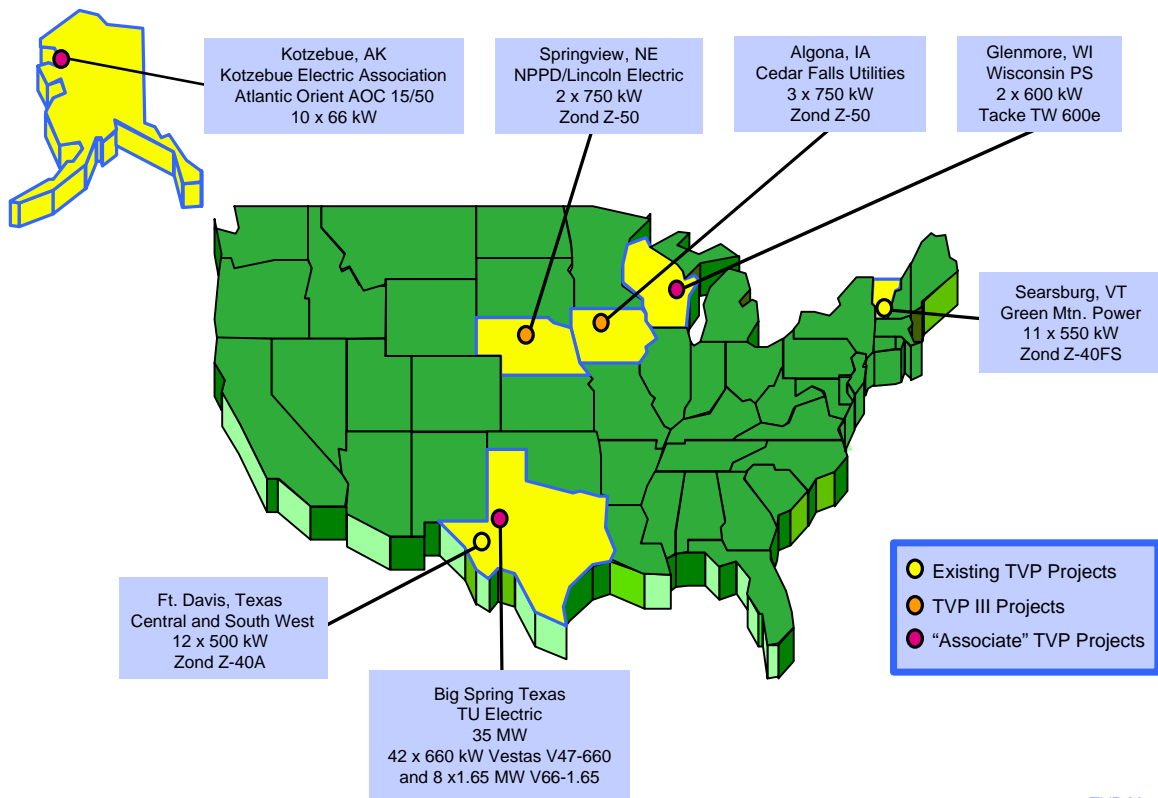
In early 1997, DOE and EPRI selected five utility distributed wind projects under Phase III of the Program (TVP III). Two of the TVP III projects were installed in Iowa and Nebraska during 1998. The 2.25 MW Iowa project is hosted by Cedar Falls Utilities in the service territory of Algona Municipal Utilities in Algona, Iowa. The other participants are municipal utilities in Ellsworth, Esterville, Fonda, Montezuma, and Westfield, Iowa. The 1.5 MW Nebraska project is hosted by Nebraska Public Power District and is located in the service territory of KBR Rural Public Power District in Springview, Nebraska. The other participants are Lincoln Electric System, the Cities of Grand Island and Auburn, Nebraska, and the Municipal Energy Agency of Nebraska (MEAN). The three other proposed TVP III projects in Texas, Oklahoma, and New York State did not go forward.

In addition, three other wind projects have joined the TVP program as Associate TVP projects. They include the 1.2 MW Wisconsin Low Wind Speed Turbine Project, installed in early 1998 by Wisconsin Public Service Corporation and three other Wisconsin utilities near Green Bay, Wisconsin; the 198 kW project installed during 1997 by Kotzebue Electric Association in Kotzebue, Alaska; and the 34 MW York Research Corporation/TU Electric wind project installed during 1999 by York in Big Spring, Texas. These Associate TVP projects participate in the TVP program and receive limited technical and financial support for data collection and performance testing, but receive no financial support for project installation and operation. The Wisconsin project is a joint project between EPRI, Wisconsin Public Service, Wisconsin Electric, Wisconsin Power and Light, and Madison Gas and Electric Company. The Big Spring project provides wind energy under contract to TU Electric.

Figure 1. EPRI-DOE Wind Turbine Verification Program Organization



DOE-EPRI Wind Turbine Verification Program



TVP Map 8-99

Figure 2. Locations of EPRI-DOE Wind Turbine Verification Projects

Table 1. EPRI-DOE TVP Wind Project Description and Status – August 1999

Host Utility	Location	TVP	Turbines	Other Funders and Participants	Status
Central and South West Services	Fort Davis, TX	I	12 x 550 kW Zond Z-40-A	EPRI	Second year operation completed June 1998; aileron linkages upgraded 1998.
Green Mountain Power	Searsburg, VT	I	11 x 550 kW Zond Z-40-FS	EPRI	First year operation completed June 1998.
Cedar Falls Utilities	Algona, IA	III	3 x 750 kW Zond Z-50	Algona, IA and 5 other munis	Wind turbines installed August-September 1998.
Nebraska Public Power District	Springview, NE	III	2 x 750 kW Zond Z-48	Lincoln Electric, KBR RPPD, and 3 other public powers, EPRI	Wind turbines installed September-October 1998.
Wisconsin Public Service Corp.	Glenmore, WI	A*	2 x 600 kW Tacke 600e	EPRI, Wisconsin P&L, WEPCO, Madison G&E	EPRI TC project with four WI utilities, turbines installed January, 1998.
Kotzebue Electric Association	Kotzebue, AK	A*	10 x 66 kW AOC 15/50	NREL	NREL STEP Project installed 1997, installing 7 more turbines during 1999.
TU Electric	Big Spring, TX	A*	41 MW 42 x 660 kW Vestas V47-660 & 8 x 1.65 MW V66-1.65	York Research Corp. (Developer)	TVP Associate Project under development, 42-V47 turbines and 8-V66 turbines accepted 1999.

*Associate TVP project