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A Retrospective of VAWT Technology

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Abstract

The study of Vertical-Axis Wind Turbine (VAWT) technology at Sandia National Laboratories started in the 1970's and concluded in the 1990's. These studies concentrated on the Darrieus configurations because of their high inherent efficiency, but other configurations (e.g., the Savonius turbine) were also examined. The Sandia VAWT program culminated with the design of the 34-m 'Test Bed' Darrieus VAWT. This turbine was designed and built to test various VAWT design concepts and to provide the necessary databases to validate analytical design codes and algorithms. Using the Test Bed as their starting point, FloWind Corp. developed a commercial VAWT product line with composite blades and an extended height-to-diameter ratio. The purpose of this paper is to discuss the design process and results of the Sandia 34-m VAWT Test Bed program and the FloWind prototype development program with an eye toward future off-shore designs. This paper is our retrospective of the design, analysis, testing and commercial process. Special emphasis is given to those lessons learned that will aid in the development of an off-shore VAWT.