SANDIA REPORT
SAND90-1615 UC-261
Unlimited Release
Printed February 1992

Selected Papers on Wind Energy Technology

Sandia National Laboratories Staff
January 1989-January 1990

Sandia National Laboratories
Albuquerque, New Mexico 87165 and
Livermore, California 94550

ABSTACT

The Sandia National Laboratories Wind Energy Research Division and supporting staff in aerodynamics, applied and experimental mechanics, and metallurgy have worked for 15 years to advance wind turbine technology, with special emphasis on vertical axis wind turbines (VAWTS). In the last few years, analytical tools and improved analysis techniques have been documented, most of them in conference proceedings. A selection of these papers has been brought together here in a single, comprehensive format to illustrate the scope of recent Sandia wind energy research and development. Twelve papers have been selected from the last two years of the annual forum provided by the ASME Wind Energy Symposium. Three papers are included from the proceedings of conferences in the United States, Canada and Europe.

Many of the papers in this volume focus on the DOE/Sandia 34-Meter Test Bed, a research VAWT. The 34-Meter Test Bed, dedicated in May 1988, has been used to validate analysis techniques and demonstrate the improved aerodynamic and structural performance of advanced components, including natural laminar flow airfoils, step tapered blades, and a variable speed generator. The Test Bed clearly emerges as a stepping stone in the VAWT development process and serves as an important benchmark in software evaluation efforts. Building and operating the Test Bed has thrown the harsh light of reality on the technical predictions made during the design effort; the results shown here are most encouraging.

Advances in fatigue analysis, structural dynamics, variable speed control, and aerodynamic performance are also shown in these papers. It is our intent that this compilation of past work serve as a milestone marking our current position and guiding future efforts to advance the state of the art in wind turbine technology.

Paul S. Veers

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550
for the United States Department of Energy
Under Contract DE-AC04-76DP00789