

Gust of innovation

Boeing's interest in wind energy started an environmental legacy that lives on today

By Eve Dumovich

You know that Boeing has led the world in aerospace technologies and achievements. But did you know that Boeing once led the world in harnessing the wind for energy?

During the 1980s, Boeing built the largest wind turbines in history and constructed the first "wind farm." "Wind energy has a potential we are just now beginning to tap," said U.S. Rep. Mike McCormack (D-Wash.) on April 17, 1980, at the ceremony launching the Boeing-built wind turbine farm near Goldendale in southwest Washington. Breakthroughs such as these established a legacy that highlights the company's continuing commitment to pioneer environmentally progressive technologies.

Boeing entered the wind business after the Organization of Petroleum Exporting Countries oil embargo in 1973, which caused high fuel prices and long lines at gas stations. The U.S. Department of Energy asked for proposals demonstrating the commercial feasibility of wind power. In 1977, Boeing Engineering and Construction Company won the contract for design, installation and testing of 2,500-kilowatt wind turbine systems.

The resulting three 350-foot (107-meter) tall MOD-2 wind turbines at Goldendale began producing power in May 1981. The Bonneville Power Administration bought output of the Goodnoe Hills machines and integrated it into the regional power grid through lines owned by the Klickitat County Public Utility District, the county where Goldendale is located.

"The ambitious Bonneville Power Administration MOD-2 program will no doubt make the Pacific Northwest this country's leader in man's efforts to harness the wind," Washington state



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– T. Wilson, former Boeing CEO

Governor Dixy Lee Ray said at the time.

By the end of 1982, MOD-2 Boeing wind turbines also were operating in Medicine Bow, Wyo., and in Solano County, Calif.

The Goldendale and Wyoming sites were primarily research sites for Boeing, Bonneville Power Administration, NASA and Battelle Northwest Laboratories. The Solar Energy Research Institute also evaluated the suitability of megawatt-size wind turbines as a source of electricity.

The Solano MOD-2 turbine was the first built for a commercial customer and was sold to the Pacific Gas & Electric Company of San Francisco.

“The MOD-2 wind turbines are designed to be of commercial value. We are confident that they represent the beginning of production in quantities that will make a significant contribution toward easing the energy crisis,” Boeing CEO T. Wilson said at the time.

The MOD-2 wind turbines operated through 1986, until the tests had been completed, and then were dismantled. In 1985, their last full year of operation, the combined electrical output of the three turbines was 8,251 megawatt-hours—enough to power about 1,000 average Northwest homes for a year.

Project manager Peter Goldman called the five-year, \$55 million research project “an absolute success.” With the test finished, the Medicine Bow MOD-2 wind turbine was sold for scrap metal in 1987.

The next-generation Boeing-built wind turbine, the MOD-5B, was barged to Kahuku, Hawaii, in 1986 and was running by July 1987. It weighed 939,000 pounds and had a 320-foot-diameter, two-blade rotor on a 200-foot steel tower (426,000 kilograms, 97.5 meters and 61 meters, respectively). By Nov. 20, 1987, the turbine completed its first 1,000 hours of operation and had produced enough electrical energy for 1,500 homes.

Early in 1988, operation of the turbine was transferred to Hawaiian Electric Incorporated, then to the Makani Uwila Power Corporation and kept in service intermittently until late in 1996. At that time, due to financial difficulties, the wind turbine was shut down along with the rest of MUPC and passed to the property owner, Campbell Estates.

With no prospects for continued operation, Campbell Estates

decided to disassemble and scrap the MOD-5B. Before this decommissioning, the DOE and the National Renewable Energy Laboratory salvaged the drive train gearbox and generator in July 1998.

Although Boeing left the wind turbine business during the late 1980s, the Boeing-built wind turbines set several world records for size and power output. In 1987, the MOD-5B was the largest single wind turbine operating in the world. It featured the first large-scale variable-speed drive train and a sectioned, two-blade rotor that enabled easy transport of the blades.

The Boeing wind turbine R&D program pioneered many of the multimegawatt turbine technologies in use today, including steel tube towers, variable-speed generators, composite blade materials and partial-span pitch control, as well as aerodynamic, structural and acoustic engineering design capabilities.

Boeing continues to pioneer advancements in environmentally progressive energy sources that offer the potential to reduce greenhouse gas emissions. The company’s wholly owned subsidiary Spectrolab is one of the world’s leading solar cell manufacturers, and its Earth-based concentrator cells have achieved 40.7 percent efficiency in converting sunlight to electricity. To help move aviation closer to a sustainable fuel supply, Boeing has partnered with airlines, engine companies and fuel processing technology leaders and supported four test flights highlighting the technical feasibility of using sustainably grown, advanced-generation biofuels that do not compete with food crops or for water resources, such as jatropha, camelina and algae.

And last month, Boeing and Vestas, the world’s largest manufacturer of wind turbines, said they’d seek opportunities to work together on joint research projects that further the development of environmentally progressive technologies. ■

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PHOTO: During the 1980s, Boeing-built MOD-2 wind turbines operated in Washington state, Wyoming and California. **BOEING ARCHIVES**