Wind Technology Essay, Research Paper

Wind Turbine Technology

Since early history, people have been harnessing the energy of the wind. Wind energy propels boats along rivers, simple windmills, and pumping water as early as 5000 B.C. New ways of using the energy of the wind eventually spread around the world. By the 11th century, people in the Middle East were using windmills extensively. Settlers took this new technology to the New World in the 19th century. They began using windmills to pump water for farms and ranches, and later, to generate electricity for homes and industries. In the 1940s large wind turbines began to operate small industries.

Wind turbines fall into two basic categories, the horizontal-axis variety, and the vertical-axis design. Modern wind turbines take advantage of many of today’s high-tech technology uses such as aerodynamics, engineering, and electronics. Wind turbines that are grouped together are called “wind farms”, and generate a lot of bulk electrical power.

Wind farms are in a variety of sizes and power ratings, depending on the location of where the farm is located. Some of the wind turbine propellers can span more than the length of a football field, and can stand up to twenty stories high, which creates enough electricity to power 1,400 homes. Some of the smaller turbines are 8-25 feet in diameter, and stand up to approximately thirty feet tall, which supplies the electrical needs of a small business or an all electric home.

Constructing electric-generating wind turbines, regardless of the shape or size, consists of the rotor, the electrical generator, a speed control system, and a tower. Some wind turbines have the options of fail-safe shutdown systems. Fail-safe shutdown systems are designed to turn the blades out of the wind, or simply “put on the brakes” in the event of a mechanical failure.

Wind energy is abundant throughout the United States. Characterized by wind-power density classes, ranging from the lowest class-1, to the highest class-7 are wind resources. Along the East Coast, the Appalachian Mountain chain, the Great Plains, the Pacific Northwest, the average annual wind speed is 13 miles per hour, considered to be a good wind resource, (which has a power density of 3 and above). “Researchers estimate that there is enough wind potential in the United States to displace at least 45 quads of primary energy annually used to generate electricity, based on “class 4″ winds” (Nix, Gerald R., 1995).

The popularity of using wind energy has always fluctuated with the prices of fossil fuels. “Wind energy is a commercially available renewable energy source, with state-of-the-art wind plants producing electricity at about $0.05 per kWh. However, even at that production cost, wind-generated electricity is not yet fully cost-competitive with coal- or natural-gas-produced electricity for the bulk electricity market” (Nix, Gerald R., 1995). Even thought the cost is temporarily higher than today’s electric cost, the price of wind technology continues to fall each year. “Wind energy has been the fastest growing source of electricity generation in the world in the 1990s” (Quick Facts About Wind Energy, 2001). With continual growth of higher energy costs, the use of wind energy is becoming more and more conventional.

“Wind energy is an environmental technology that doesn’t emit acid rain precursors, greenhouse gases, and other air pollutants. The growing concern about the environment is expected to drive markets for wind energy around the world” (DOE, Industry Improving Technology, lowering costs, 1992). Wind energy is a totally free renewable resource. With the wind being a renewable resource, and a part of natural nature, there is never the concern of wind running out. Wind potential, as said earlier, is abundant throughout the United States. The use of multiple wind plant farms within a region could result to where the output of one wind farm could potentially increase the output of another wind farm because of wind fluctuations. “North Dakota, alone, has enough energy from class 4 and higher winds to supply 36 percent of the electricity of the lower 48 states” (Quick Facts About Wind Energy, 2001). Many of today’s wind farms are located on farming or grazing grounds, which is good because it is putting the land to use for not only one need supply, but two.

However, there are some environmental issues that must be addressed. Many of the birds that we have today have been flying into the operating blades of the wind turbines. This is a concern greatly because many of the birds killed are raptors such as the golden eagles. Another concern is the noise produced by the rotor blades. “The major challenge to using wind as a source of power is that it is intermittent and it does not always blow when electricity is needed. Wind cannot be stored (unless batteries are used); and not all winds can be harnessed to meet the timing of electricity demands” (Quick Facts About Wind Energy, 2001). Most good wind farm cites tend to be located in remote regions, which can make it hard to reach areas where lots of electrical power is demanded, such as cities. Yet another concern, but minor one, is the aesthetical value of the design of the wind turbine. Many people tend to not like the looks of the designs of the wind farms.

I think that the use of wind turbine technology could become a very vital form of producing electricity. I feel that the advantages of wind power by far out weigh the disadvantages. Wind turbine technology has had drastic improvement over the last ten years, and is almost able to compete with our fossil fuel electrical prices. With the wind being to main resource, we will never have the concerns of it running out, which compared to the resources now, it a great advantage. The use of the wind turbines is also environmentally safe for our atmosphere.

Wind energy could become one of the most important applied renewable energy forms for several decades to come. There are still challenges to be met, but with more time, they are solvable. Even though wind power may not become the sole use of our electricity, it will drastically reduce the amount of fossil fuel usage. Wind power has a very expansive future and is a definite technology innovation that needs to be applied more.