produce 1.5 to 2.0 megawatts in high-wind regions. The largest in the series, the Mod 2, will have a rotor 300 feet in diameter. It is due to start turning in late 1979 for a cost of $10 million.

While ERDA has not yet begun operation of one of its 200-kilowatt wind machines destined for Block Island, a private company has built a similar-sized wind machine—reportedly for much less money—on another island not far away. The inhabitants of Cuttyhunk Island, between the Massachusetts mainland and Martha's Vineyard, wanted a windmill to offset the skyrocketing cost of fuel for their diesel generating system. A company named WTG, Inc., in Angola, New York, wanted a site to test a prototype for a large wind system. Because the uncle of one of WTG's founders had a summer home on Cuttyhunk, the two parties got together. A 175-kilowatt wind turbine is now being given its first tests at a site just outside the town of Gosnold (Fig. 2). It will be linked with the present diesel unit to form a hybrid system to supply the island's needs. The turbine will reach its maximum rated power at a wind speed of 28 miles per hour. The average annual wind speed on the island is 16.8 miles per hour.

The WTG rotor was built to be as simple as possible for reliability. It is a fixed-pitch, three-bladed steel rotor, 80 feet in diameter, on an 80-foot tower. The system was modeled after the Danish Gedser mill in many respects, according to Alan Wellikoff at WTG. It will be operated as a test system for the next year, and then the town will have the option to buy it. The final cost of the Cuttyhunk machine is not yet known, but at one point the whole project was estimated to cost less than the hub mechanism of ERDA-NASA's Plum Brook machine, according to Wellikoff.

While the paper studies all show that large machines can be made cheaper than small ones, practical experience has yet to bear this out. The Mod 0 cost more than $5500 per kilowatt, and the Mod 1 machine is now projected to cost $1800 to $2200 per kilowatt. The studies all postulate a "learning curve" that will steadily reduce costs, but no two studies agree on the magnitude of the reduction. A recent survey of all the economic projections for large wind machines by JBF Scientific showed a range of $400 to $900 per kilowatt after the first 100 units were completed, but Divone says that the cost the agency realistically hopes to achieve is more like $750 to $1000 per kilowatt. Whether aerospace companies, which are accustomed to small production runs, can achieve the projected cost reduction is yet to be determined.

To achieve a given amount of wind generating capacity, more small machines would be produced with a greater potential for manufacturing cost reductions. The ERDA goals for the small wind program are illustrative of this. Based on a production run of 1000 units, the cost goals for the small wind program are $750 per kilowatt for the 8-kilowatt machine and $500 per kilowatt for the 40-kilowatt turbine, according to George Tennyson of ERDA. The sizes of small systems are close to the scale of industrial goods that have shown large economies of production in the past, whereas the rotor on a Mod 1 turbine will be almost identical in size to the wing of a 747 aircraft.

For wind turbines, however, there may be less correlation between the amount of energy generated over the course of a year and the name-plate capacity rating than for other types of energy systems.

The Bureau of Reclamation has done a rather thorough study of the wind conditions at Medicine Bow, Wyoming, and concluded that a field of Mod 1 turbines there could produce electricity at a cost of 2 cents per kilowatt-hour, even though the turbines would have a capital cost of $1300 per kilowatt. The extremely high average winds at the site, plus the opportunity to use the wind system in conjunction with the Flaming Gorge and Glen Canyon hydroelectric systems (getting the same effect as energy storage by holding back water when the wind is blowing), make this site particularly attractive. Forty-nine turbines would provide 8 million kilowatt-hours of electricity per year, according to the Bureau.

Other attractive storage possibilities for use with wind power also exist in the West. Particularly in the Panhandle of North Texas, gas companies have stored natural gas in underground wells for years. On the basis of typical pressures and flow rates, compressed air energy storage in the same formations would cost $95 per kilowatt or about 2 cents per kilowatt hour, according to Eldridge at the MITRE Corporation. Compressed gas is also stored in many other regions.

Both large and small wind systems have the potential to be competitive with conventional electric systems. A twofold cost reduction would make them attractive in many places, and such a reduction is quite feasible for a product that now has only 10 to 20 percent of its costs in materials. Once competitive, the primary limitation to wind energy use would be the rate of growth of the industry.

—WILLIAM D. METZ

UPDATE

Drug for Treatment of Herpes Encephalitis

The first successful drug therapy of a life-threatening viral disease has been achieved by a nationwide team of investigators headed by Charles A. Alford and Richard J. Whitley of the University of Alabama Medical Center. They reported last month that as many as 90 percent of patients with the generally fatal disease herpes encephalitis can be cured with the drug ara-A. Their results lend strong support to the controversial concept that chemotherapy can be a successful weapon against viruses without killing an unacceptably large number of host cells.

Ara-A, also known as adenine arabinoside or vidarabine (and given the trade name Vira-A by its manufacturer, Parke, Davis & Company), has previously been shown in preliminary studies to be effective against chicken pox and herpes zoster or shingles (*Science*, 9 April 1976, p. 128). Parke, Davis also received permission earlier this year from the Food and Drug Administration to market ara-A for topical treatment of herpes keratitis, an eye infection with often serious consequences. Ara-A thus becomes the third commercial antiviral agent accredited in this country, joining idoxuridine, which is also effective against herpes keratitis, and amantadine hydrochloride, which is effective against influenza A viruses.

In the studies on ara-A, the investigators identified 28 individuals with herpes encephalitis, an infection characterized by a severe inflammation of the brain for which there was previously no effective therapy. Eighteen received ara-A and ten received a placebo. Seven of those who received a placebo died (70 percent), compared to only five of those who received ara-A (28 percent). Only one of ten individuals who received the drug before lapsing into a coma died (10 percent), indicating the importance of early diagnosis of the disease. These results are so impressive that the investigators have abandoned their original protocol and are no longer using the placebo.

Despite the success of ara-A against various types of herpes, it is still a limited tool because it must be given intravenously continuously. Investigators are trying to perfect forms of ara-A that would not have to be given in this way, and clinical studies with one such form are now in progress. When such forms have been perfected and are widely available, the age of antiviral chemotherapy will truly be with us.—T.H.M.