

Consider windmills to harness energy

LANCASTER — Have you looked at your electric bill lately? If you find there's been a drastic increase in what you're paying over recent months, you may want to look into an alternate energy source, says Robert Bartlett, a wind power specialist from North East.

If you have a high hill on your property that's not obstructed by trees with a good wind location—that is, where there is a constant wind of over 10 miles per hour—a wind mill might be just the answer to your energy needs.

"A windmill should be located 35 feet above any trees or other obstacles," according to Bartlett. "This footage should be measured from the top of the lowest point of the prop travel."

With the help of an anemometer to measure the wind, an individual can check wind speed over a period of time in both the summer and winter to determine working wind speeds and figure out what a mill

can produce.

"Do this long before you buy," recommends Bartlett, "because you'll be spending a lot of money for your machine. If you're figures show it won't pay because of low wind, don't buy."

In order to emphasize the need to study the many factors determining whether or not to install a windmill, Bartlett shares his own experiences:

"In search for a mill for my needs I uncovered many, many flaws in the mills on the market today.

"I visited the government testing grounds in Rocky Flats, Colorado and saw many machines in operation—upwind, downwind, single-blade, multi-blade, and three-blade machines.

"In all the machines I saw the day I was there, two had reached turning speed: Only one was up to operating speed, and that was Jacob's, manufactured in Minneapolis, Minnesota. This com-

pany is the Cadillac of the wind industry with 50 to 60 years experience and 75,000 machines.

"Considering all the information I could get, I decided to go with this old reliable firm and purchase a small used Model 18 and Model 25 machine. The generators are a low RPM (250), high output machines weighing about 400 pounds. The brushes are large and last from 5 to 8 years before needing replacement. The bearings are tapered rollers lasting 20 to 40 years depending on the locality, with dust and sand being their worst enemy.

"I rewound the generators and put in compound shunt fields to increase their output. Also, I added another Model 18 to the small mill and increased its total output to 5400 watts at 25 MPH winds.

"I designed a curved surface on a new prop for the twin mill to increase its power. The governor on the prop controls the mill from running away in high winds, much

the same as the prop governor on an aircraft. This type of control turns each blade equally to cause the blades to get less bite of the wind as the speed increases, therefore holding the speed constant. Other mills use brakes or partial blade turning or even extreme heavy loads, none of which control as effectively as the Jacobs-type governor.

"The prop is constructed of Sitka spruce which is ideal for windmill operation. It has high resistance to warping and yet will bend in very high winds and not break.

"Fiberglass blades do not work as well because of the chance of their cracking in severe cold. Metal blades are heavier (even aluminum) and will frost up quickly in cold weather thus causing the prop to be off balance, causing strain and stress on the tower.

"The tail is constructed of angle iron and galvanized metal and is light in weight. It is durable and keeps the prop headed into the wind.

"To hoist the mill into place we used a winch and gin pole. This can be easily made out of extra heavy pipe, a couple of pulleys, and about 200 feet of cable."

Bartlett points out the Jacobs company added a new 10 KW machine to their line last August. He claims this machine out-produces its competitors by as much as 1½ to 2 KW at the normal working winds of 8 to 15 MPH winds.

This windmill uses a 23-foot Sitka spruce prop with a light weight centrifugal governor. The power unit is a 220-volt brushless alternator with fields energized by utility power lines. With this unit, it needs to batteries for storage.

The power line and the windmill couple together, and power goes into a main fuse panel. Power comes from the windmill first; then if the wind speed is low, the balance of electricity comes from the power line. If the mill produces too much electricity, it puts power on the line and the excess is purchased at wholesale cost. This is all done automatically.

As a safety precaution, the mill will not produce power during a

line breakdown, thus eliminating possible injury to repairman from the power company. This is accomplished by the fields being energized by the power line. With no field excitation, the alternator is powerless, Bartlett explains.

Bartlett offers the following advice for erecting a windmill:

"The mill should be tilted back into the wind by 8 to 14 degrees. It has been proven the wind comes slightly downward as it blows regardless of direction. This makes the prop more perpendicular to the wind and increases power while at the same time reducing vibrations.

"The tower for the early mills as well as the new ones should be at least 35 feet above all obstacles and should be free standing. Guyed towers run into vibration problems.

"The legs of each tower should be buried 5 to 10 feet in the ground. The depth depends on whether you use a 60, 80, 100, 120 foot tower. On the bottom of each leg is a square pad and above this is poured concrete. Thus each leg is highly grounded resting deep into the ground and standing directly on the ground. This is for high lightning protection.

"The lead in cable to the house should be buried at least 2 feet all the way to help ground it from lightning. If using overhead wires, a lightning arrester must be used at the house. Zig-zagging the cable down the tower also helps because lightning likes to follow a straight line, not a curved one.

An incentive for installing windmills in ideal locations, adds Bartlett, is the new federal law which requires power companies to buy all excess power produced by a mill. The best part of the new tax laws, he claims, is the tax credit deduction which allows a person to deduct up to 40 percent of the mills cost with a maximum of \$4,000. "This is right off the top (tax money), not another deduction," he says.

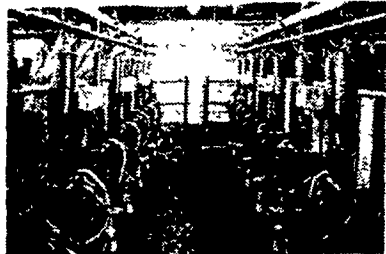
"If you don't like your high electric bills and you are in a good, windy location, take a look at a windmill, about 10 KW," concludes Bartlett. "Compare windmills to match your working winds."



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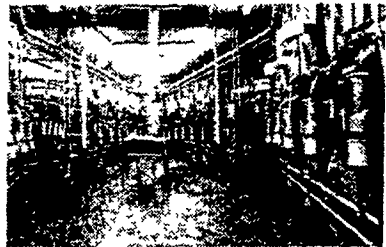
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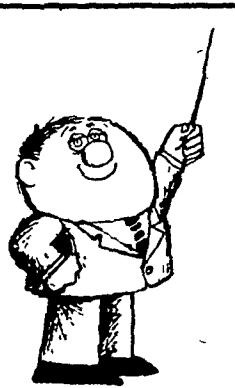
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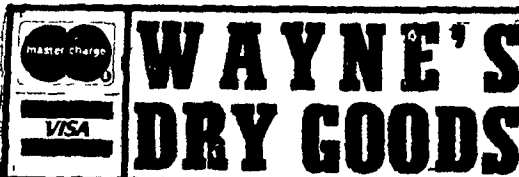
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