

## About the Money by Dorothy Allen

As some of Nahant residents may know, the idea of studying wind power development in Nahant, at no cost to the town, received the support from the Nahant Selectmen on June 2. On June 9, late in the evening, however, the variance to allow for the temporary, one time installation of a six inch wide and 132 feet high meteorological tower (met tower, to measure wind speed) was denied by the town's Zoning Board of Appeals. Now, the fate of locating a met tower and thus qualifying for substantial support for wind power development in Nahant from the Massachusetts Technology Collaborative (MTC) is in the hands of the Planning Board. In the near future the Planning Board, following its own recommendations, may hold a Public Hearing on changing the town's zoning by-laws to accommodate this one time, temporary structure. Following such a hearing the change in the zoning by-laws would need to be voted on and approved by two thirds of the Nahant residents at a Special or the Annual Town Meeting, this just so that Nahant can measure wind!

After the failed efforts by the Nahant's Alternative Energy Study Committee to get the met tower off the ground (or at least upright) and after the July Harbor Review article expressing my disappointment, several of you have asked me about the figure of the half million annual income for the town from wind. To arrive at this figure I multiplied the reported net annual income from the Hull turbine by four ( $\$ 130,000 \times 4 = \$ 520,000$ ) and then reduced it a bit to be fiscally conservative. The model I considered was four of Hull's size machines along the Causeway connected to significant electrical loads on the Lynnway. This kind of income could relieve the financial hardship of quite a few tax overrides.

To better inform Nahant residents about how money can be made from wind turbines and to illustrate why a met tower and the MTC's offer is valuable let me briefly explain.

First, we must start with the turbine and its relationship to the wind. The force of the wind spins turbine blades and rotor. At the top of the turbine is a generator that, with the use of very fancy (patented) gears, an electromagnet and a lot of copper coils, converts the spinning rotor movement (kinetic energy) into electricity (electrical energy). This is the reverse process of that which takes place in, let's say, a fan. A turbine is rated for a certain maximum power output at an optimum wind speed (Hull's is a 660 kW machine). To arrive at how much electrical energy a turbine can produce we must have information on the speed and duration of wind, preferably near the potential location of a turbine. This wind distribution information allows us to calculate the Capacity Factor for a turbine (Hull's is about 0.28). The annual electrical energy produced by a turbine can be calculated by multiplying the turbine capacity by the Capacity Factor (for Hull approximate numbers follow,  $660 \text{ kW} \times 0.28 \times 365 \times 24 = 1,618,848 \text{ kWhr/year}$ ). **To be able to calculate the power generation in Nahant, wind data from a met tower in a location within a mile radius of the turbine(s) are indispensable and can be obtained for free from the MTC, ONLY if we are willing to measure wind.** For size, the base of the Hull's turbine is 12 feet in diameter (two SUV parking spaces) and is 195 feet high

to the tip of the blade (about twice the size of our cell tower). The blades do not revolve faster than 28.5 revolutions per minute and resemble Ferris Wheels rather than helicopter propellers.

Second, to make money with a turbine the electricity must be sold. There are three potential revenue streams: 1) sale to a utility or a municipal power company at maybe .04 \$/kWhr or sale worth potentially more to an end user, like Lynn Water and Sewer, if direct connection can be made, 2) sale of Renewable Energy Certificates to marketers, like Massachusetts Consumers Alliance, or a utility at maybe .035 \$/kWhr, 3) receipt of the federal Renewable Energy Production Incentives (presently tied up with Dick Cheney's Energy Bill) of .018 \$/kWhr. The three revenue streams add up to .093 \$/kWhr and multiplied by the above figure of 1,618,848 kWhr/year give us a revenue stream of 150,553 \$/yr. Hull's turbines electricity is worth more because instead of selling the power to the utility, Hull simply does not buy the power from the utility. Instead of getting 0.04 \$ Hull does not spend 0.08 \$ per kWhr. Hull can do this because it has a municipal power company while Nahant does not. Although Nahant may not be willing or be able to acquire the ownership of the local electrical distribution system, we may be able to increase the revenues considerably if the sale of electricity involved a user who presently pays retail electric rates. **To find out if this is possible, the town could use the free services of knowledgeable legal and financial professionals, such as those available through the MTC, ONLY if we are willing to measure wind.**

Third, to arrive at net income to the town we must consider costs. While the insurance and the operation and maintenance costs are low (Hull's are 16,000 \$/yr) and there are no fuel costs, the capital cost of the machines is the main expense. The Hull machine, with installation and first year operation and maintenance contract, cost just over 1,000 \$/kW of installed capacity (\$ 700,000/660 kW=1,060 \$/kW). The MTC, upon community's acceptance of a wind power development project, is considering buying-down turbine costs. **This is why accepting the MTC offer of assistance may be the only chance for Nahant to have a truly viable project, ONLY if we are willing to measure wind.** To satisfy your curiosity about the potential wind power project net cash flows to the town, I invite you to visit the Nahant Alternative Energy Study Committee location on the Town of Nahant web site. In Appendix 6.1 you will find the "Community Calculator" and with that you may experiment with the model's sensitivity to capital costs, lending rates and electricity sale price. Under the right circumstances it becomes apparent that money can be made. Ownership of the machines can take many forms from direct town ownership, to partnerships with developers, to leasing land to developers, to forming a cooperative.

If you are skeptical about the information that I present, you very well should be. I am not any kind of an expert, except maybe a very good mom. **However, this much is true, allowing the met tower to measure wind in Nahant makes us eligible with the MTC for all necessary pre-development studies that require expert engineering, legal and financial services at no cost.**

Finally, I would like to conclude with one more calculation. Saudi Arabia, the only oil producer with spare capacity (this means it can increase oil production upon increased

demand), has reserves of about 220 billion barrels of crude. It presently pumps at close to 10 million barrels per day. That's 3.65 billion barrels per year. At this current pumping rate the last drop would be pumped out in 60 years ( $220/3.65=60$  years) or so the cartel would have you to believe. In truth the last drop will never be pumped out. Energy analysts concur that as Saudi Arabia nears its peak oil production (in several years) the increase in cost of oil will cause unrelenting inflation in the energy and food sectors of the economy. As personal disposable income decreases economic expansion will not be possible, causing what Allan Greenspan warns of as stagflation. Unless people, particularly in the US, aggressively demand and use technologies that increase energy efficiency, bio-fuels and electricity and hydrogen produced from renewable sources, there will be limited fuel and energy alternatives. This economic nightmare could make our current war on terror look like a side-show. **Showing our state and federal governments that we are more than willing to consider wind power in our community is the last and best reason for accepting free services from the MTC.**

As for me, awaiting those 50 \$/barrel crude oil prices this winter, I am calling the nice man about the two cords of wood for my stove. I just hope he has enough gasoline to run his machinery and truck.