

Wind Energy Math Calculations

Word Problems

1. The Searsburg, Vermont wind farm was installed in 1997. The developers had to take out a big loan from the bank to pay for the wind farm. In the first year, they had to make \$2.1 million in electricity sales to pay back the loan. The project produces about 14,000,000 kWh per year. How much do they need to sell this electricity for (per kWh) in order to make enough revenue to pay off the loan?
2. Assuming that they sold the electricity for the amount determined above every year, about how much revenue did they make from 1997–2007 (10 years).
3. If the full wind farm cost \$15,750,000 to construct and install, how long did it take to pay off the full cost of the wind farm assuming the electricity was sold for the amount determined above? About how much profit was made from the time this wind farm was paid off through 2007?
4. If the project fell short of its expected production (14,000,000 kWh/year) by 10% in the first year, how much more would they have to charge for the electricity in order to pay off the loan at the end of the year?
5. If the project fell short of this expected production by 10% every year, but electricity prices were *not* increased, how long would it take to pay off the full wind farm?
6. Still assuming the project fell short of production by 10% every year, and electricity prices were the same as in question 1, how much profit was made from the time the wind farm was fully paid off through 2007?
7. A new wind farm is being proposed in your town. It will consist of 42 Suzlon S88 wind turbines. These turbines are rated at 2.1 MW each. Based on wind data collected over the last few years, the turbines are expected to average about 60 percent of this capacity throughout the year. With these figures in mind, how much power will the entire wind farm be producing on average (in MW)?
8. Assuming this wind farm produces the average you found above for one full year, how many megawatt-hours will it produce the year? How many Kilowatt-Hours is that?
9. If they sold this electricity for the same amount as the Searsburg, VT wind farm sold it for (Question 1), how much revenue would the wind farm produce each year?
10. If the developers agreed to pay your town 6% of the total wind farm revenue each year, how much money would go to the town every year?

