Small Wind Capital Cost Recovery Worksheet

You may have several reasons to consider purchase of a wind turbine generator, especially the potential of saving on your electric bills. If bill savings are important, you should estimate the cost of electricity produced by your selected unit before you buy. This analysis will enable you to estimate the annual operating cost of a small wind system and compare that cost to the cost of the electricity you purchase from Midwest Energy.

1. Enter the total cost of purchasing and installing the generating equipment including interconnection and electric system upgrade costs.	$ ______
2. Enter the amount of grants, tax credits, or other funding not required to be repaid by customer for the purchase and installation of the generating equipment. See tax credit note below.	$ _____
3. Subtract Line 2 from Line 1 to determine the net cost of the entire project.	$ _____

Federal Tax Credit Note: Owners of small wind systems with 100 kilowatts (kW) of capacity or less can receive a federal tax credit for 30 percent of the total installed cost of the system.

Table 1

Years	**7.5 %** Capital Recovery Factor	**6.5 %** Capital Recovery Factor	**5.5%** Capital Recovery Factor	**4.5 %** Capital Recovery Factor	**3.5 %** Capital Recovery Factor
1	1.0750	1.0650	1.0550	1.0450	1.0350
3	0.3845	0.3776	0.3707	0.3638	0.3569
5	0.2472	0.2406	0.2342	0.2278	0.2215
10	0.1457	0.1391	0.1327	0.1264	0.1202
15	0.1133	0.1064	0.0996	0.0931	0.0868
20	0.0981	0.0908	0.0837	0.0769	0.0704
25	0.0897	0.0820	0.0745	0.0674	0.0607
30	0.0847	0.0766	0.0688	0.0614	0.0544
35	0.0815	0.0713	0.0650	0.0573	0.0500
40	0.0794	0.0707	0.0623	0.0543	0.0468

4. Enter from the top row of Table 1 either: (a) the interest rate of borrowed funds to purchase the generating equipment, or (b) the interest rate that would be received on the money used to purchase the generating equipment if it was invested elsewhere. (Pick the closest interest rate from the table.)	_____
5. Enter from the left column of Table 1 the number of years the generating equipment can be expected to operate or the number of years for the loan. (Pick the closest number of years from the table.)	_____
6. Enter the capital recovery factor from Table 1. (Locate the interest rate in the top row of Table 1 that you entered on Line 4. Proceed down that column to the number of years corresponding to the entry on Line 5.)	_____
7. Enter the estimated capacity factor for the unit. (See note below; enter as a whole number.)	_____ %

Capacity Factor Note: Capacity factor is the percent of actual energy produced compared to full output if the wind turbine operated 24 hours per day for an entire year. A realistic upper limit is 20 to 35 percent for small systems. Some large wind farms may achieve 40 percent, but remember they are located on the best sites with towers up to 300 feet tall and full-time maintenance crews. Midwest Energy is installing load research meters on new wind turbine installations to gather capacity factor information. However, not enough data is available at this time to establish a benchmark.

8. Multiply Line 7 x 8760 and divide by 100 = equivalent hours of full load operation per year.	_____ hours
9. Enter the rated capacity of the generating equipment in kilowatts (kW).	_____ kW
10. Multiply Line 8 x Line 9 = kilowatt-hours (kWh) generated per year.	_____ kWh
11. Multiply the net cost of the entire project (Line 3) by the capital recovery factor from Line 6. This is the annual capital cost.	$ _____
12. Enter the estimated amount of annual maintenance cost of the generating equipment, including insurance premiums, contract maintenance, etc. See note below.	$ _____

Annual Maintenance Cost Note: According to a study published at http://www.windpower.org/en/tour/econ/oandm.htm the average annual maintenance cost for a

25 to 150 kW wind turbine is $.01 per kilowatt-hour (kWh). This is a reasonable rule of thumb for estimating Line 12 above if actual maintenance costs are unknown.

13. To determine the total annual cost (TAC) of the equipment, add Lines 11 and 12.	$ _____
14. Divide Line 13, the TAC of the equipment, by Line 10, kWh to be generated each year. This answer is the estimated cost of energy from the wind turbine generator per kWh.	$ _____/kWh
15. Enter Midwest Energy's average cost per kWh during the last 12 months. (Exclude monthly customer charges or demand charges unless you plan to totally disconnect from the utility grid. Refer to Step 1 in the "Ten Steps to a Sound Decision" paper.)	$ _____/kWh
16. Calculate savings per kilowatt-hour = Line 15 minus Line 14	$ _____/kWh

This calculation does not factor in any excess generation payments. It compares the cost of electricity from a Customer-owned generator to the cost of electricity that you would avoid paying Midwest Energy. Essentially, it assumes that all electricity generated will be used at your home or farm. In reality, that assumption is not true. The wind turbine will generate more electricity than you need at some times, and that portion is sold back to Midwest Energy.

The buy-back rate (as established by Kansas law) was about 5.2 cents per kWh for the 12 months ended August 2008. So for the portion of wind energy you generate and use, the savings per kWh are what you estimated on Line 16. But for the portion you sell back, the savings are equal to the current buy-back rate minus your cost calculated on Line 14. The larger your turbine, the greater percentage you will sell back. Thus an over-sized turbine will harm the economic benefits. This is consistent with Kansas law that states the generator, "shall be appropriately sized" for the customer's load.

It would be useful to perform this calculation several times. Use both conservative and optimistic assumptions about costs, power output, and so on to find a likely range of outcomes.