2021A8 (SAVINGS, NPV)

Level 1: The savings for each year can be calculated by multiplying the difference in price by the estimated kWh per year. Prior to having the wind turbine project, the plant would have purchased those kWh from the grid, so the lower price offered by One Energy creates savings.

$$Annual\ Savings\ (\$) = Estimated\ Wind\ Production\ (kWh) * Price\ Difference\ (\$)$$

$$Annual\ Savings\ (\$/year) = 8{,}790{,}000\ kWh * \frac{\$0.0165}{kWh}$$

$$Annual\ Savings\ (\$/year) = \$145{,}035$$

Multiply the annual savings by the 20-year project lifespan to determine the estimated total savings.

$$Total\ Savings\ (\$) = Annual\ Savings\ \left(\frac{\$}{year}\right) * Project\ Lifespan\ (years)$$

$$Total\ Savings\ (\$) = \frac{\$145{,}035}{year} * 20\ years$$

$$Total\ Savings\ (\$) = \$2{,}900{,}700$$

Level 2: Because we are interested in the NPV of the first five years of cash flows, i will be 5. We do not need the X_0 term because the customer has no initial investment. The equation will be:

$$NPV = \frac{Z_1}{(1+r)^1} + \frac{Z_2}{(1+r)^2} + \frac{Z_3}{(1+r)^3} + \frac{Z_4}{(1+r)^4} + \frac{Z_5}{(1+r)^5}$$

Because the savings are the same for each year, the numerator will be the same for all terms. The discount rate is also the same for each term.

$$NPV = \frac{\$145{,}035}{(1+0.07)^1} + \frac{\$145{,}035}{(1+0.07)^2} + \frac{\$145{,}035}{(1+0.07)^3} + \frac{\$145{,}035}{(1+0.07)^4} + \frac{\$145{,}035}{(1+0.07)^5}$$

$$NPV = \frac{\$145{,}035}{1.07} + \frac{\$145{,}035}{1.1449} + \frac{\$145{,}035}{1.2250} + \frac{\$145{,}035}{1.3108} + \frac{\$145{,}035}{1.4026}$$

$$NPV = \$135{,}546.73 + \$126{,}679.19 + \$118{,}395.92 + \$110{,}646.17 + \$103{,}404.39$$

$$NPV = \$594{,}672.40$$

An operating turbine.