WIND STUDY | Wind Study is intended for grades 5-8 and 8-11
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2024Q11 TIME VALUE OF MONEY

Hey class, today we're diving into the topic of money!

Have you ever heard someone say something like, "Back in my day, you could buy a candy bar for a quarter"? Then you've heard of the **Time Value of Money**. The main idea is simple: money you have today is worth more than money you receive in the future because money can grow over time if it earns interest. Before One Power Company performs an evaluation for a new project, we check if the project makes sense financially. In today's Wind Study, we'll discuss how we determine what a "future dollar" is worth and how we make predictions about future costs. Let's get started!

- **Interest Rate (r)**: The rate at which money grows in an investment or shrinks over a specific period due to inflation or other factors. When used in formulas, be sure to make it a decimal! (for example, 6% is 0.06)
- **Number of Periods (n)**: The total number of time intervals (e.g., years, months) over which compounding occurs. It determines how many times the interest rate is applied.
- **Present Value (PV)**: The current worth of something. This can also be the equivalent of how much something in the future is worth to you today.
- **Future Value (FV)**: How much something is worth after time has passed. This is dependent on how much time, and how high the interest rate is.

Discounting is the process of calculating PV of money starting with its FV. In other words, it tells you how much money in the future is worth today. We use the formula presented in Equation 1 for discounting.

$$PV = \frac{FV}{(1+r)^n}$$

Equation 1

Example 1 (Discounting): You are expecting to receive $110.25 in 2 years, and the bank's interest rate is 5% per year. How much is that worth today?

$$PV = \frac{110.25}{(1+0.05)^2} = \$100$$

Compounding is the process of calculating FV of money starting with its PV. In other words, it tells you how much today's money will be worth in the future. We can manipulate the formula in Equation 1 to come up with the formula presented in Equation 2, used for compounding.

$$FV = PV \times (1+r)^n$$

Equation 2

Example 2 (Compounding): You have $100 today, and the bank gives you an interest rate of 5% per year. After 2 years, how much will you have?

$$FV = 100 \times (1+0.05)^2 = \$110.25$$

Level 1: A potential wind project is estimated to produce 16,015,000 kWh each year. If we offer to sell the customer electricity at a rate of $0.0476/kWh paid at the end of each year. How much is this payment worth to us at the beginning of the year? Assume a 5.20% interest rate for the year.

Hint: We can solve for the future value and then use it to find the present value using one of the equations from page 1.

Level 2: One Power plans to build a project requiring $6,430,000 three years from now. Currently, the company has secured $3,200,000 in funding. Assume an interest rate of 4.80%

A.) What percentage of the required future value is already secured?
B.) How much additional future value funding is needed to meet the $6,430,000 goal?

Hint: remember that present values will need to be converted to future value equivalents before comparing data.