Landfill Gas to Energy Plant – Economic Feasibility

Granger Services has requested you to evaluate the economic feasibility for a landfill gas to energy plant at Granger’ proposed landfill. Assume that the landfill is expected to receive 1,100 tons/day for the first year with an annual increase of 3% in the tonnage. Assume that the landfill remains active for only 15 years and is closed after year 15.

1. Plot the gas generation curve for the landfill for 50 years since the landfill starts accepting waste. Assume \( L_0 = 2.72 \text{ ft}^3/\text{lb} \); \( k = 0.1 \text{ per year} \). Plot the curve using a plotting software (e.g., Excel, etc.)

2. Assume that landfill gas to electrical energy generator units are only available in 0.5 MW capacity and it costs about $300,000 to purchase each of such units. The typical life of these units is 25 years and each unit requires minimum 600 \( \text{ft}^3/\text{min} \) gas flow to operate and it generates maximum 0.5 MW of electricity. Ignore the operational or maintenance cost of the unit. Assume that the revenue from each of such units when operated at design capacity is about $30,000 per year.
   a. Prepare a detailed (year by year) recommendation memo to your client regarding when and how many generator units shall be purchased.
   b. Estimate the total profit from the gas to energy plant at the end of 15 years and 50 years after the landfill first started accepting waste. Ignore the depreciated value of the unit after its useful life. Note that your costs and profits will be in net present value (NPV).