1. A farmer is considering the installation of a fuel storage system that will save $0.065 per gallon because the fuel can be purchased in bulk. The farmer uses about 20,000 gallons per year. The system will cost $10,000 to install. The annual operating and maintenance costs will be nothing in the first year but will increase by $25 each year thereafter. After the ten years that the system will be used it will have a salvage value of $3,000. The farmer's cost of funds is 12%. What is the equivalent uniform annual benefit for the fuel storage system? Based on this analysis, should the farmer purchase the fuel storage?

Solution:

Savings = $0.065/gallon × 20,000 gallons/year = $1,300/Year.

Year	Operating Costs
1	$0
2	25
3	50
...	...
10	225

EUAB-EUAC ={1,300+3,000(A/F, 12%, 10)}- {10,000(A/P, 12%, 10)}-{2(A/G, 12%, 10)}

= {1300 +177} - 1,770 - 89.63 = -$388.63.

The farmer should not purchase the fuel storage system.

2. A transportation engineer in charge of maintenance of roadways is negotiating a contract for the delivery of deicing materials. The contract provides for the purchase of material at the beginning of the year for four consecutive years for the amounts shown below. If the interest rate is 9%, what is the EUAC for the deicing material?

Year	0	1	2	3	4
Purchase Cost ($)	100,000	105,000	110,000	115,000	120,000

Solution:

NPW = P + {A (P/A, i, n)} + {G (P/G, i, n)}

= 100,000 + {105,000 (P/A, 9%, 4)}+ {5,000 (P/G, 9%, 4)}

= 100,000 + (105,000 × 3.24) + (5,000 × 4.511) = $462,755.

EUAC = NPW × (A/P, 9%, 4) = 462,755 × 0.3087 = $142,852.47.

3. A DOT highway maintenance engineer has to replace a water pump in a storm water lift station on a freeway. Data for two pumps are listed below. Assuming an interest rate of 10%, which pump should the engineer select, based on an EUAC analysis?

Data	Pump A	Pump B
Useful Life, Years	6	6
Initial Cost	$25,000	$30,000
Annual Maintenance	3,000	2,000
Salvage Value	800	1,100
Annual Energy Savings	1,200	1,500

Solution:

Pump A: EUAC = {P (A/P, i, n)} -{S (A/F, i, n)} - $A_s + A_m$
= {25,000 (A/P, 10%, 6)}- {800 (A/F, 10%, 6)}- 1,200 + 3,000
= (25,000 × 0.2296) - (800 × 0.1296) + 1,800 = $7,436.32.

Pump B: EUAC = {P (A/P, i, n)} - {S (A/F, i, n)} - $A_s + A_m$
= {30,000 (A/P, 10%, 6)}-{1,100(A/F, 10%, 6)}- 1,500 + 2,000
= 30,000 (0.2296) - 1,100 (0.1296) + 500 = $7,245.44.

Choose Pump B.