

Fundamentals of the Monetary Evaluation

WHAT: A comparison of the monetary costs of two or more alternatives being considered to address a common need and produce the same desired end.

WHY: To account for the fact that money changes value over time and to allow for an understandable comparison of more complex cash flows that take place over time.

HOW: A total present worth analysis.

COMPONENTS:

1. Planning Period = 20 years.
2. Capital Costs = All costs (immediate and future) to construct the proposed project, excluding sunk costs. Land costs can be escalated.
3. Capitalized Interest = Any interest costs incurred to “carry” the borrowing during construction (although capitalized interest will not normally be included in a revolving fund loan).
4. Operation, Maintenance, and Replacement (OM&R) Costs = All costs projected to be incurred to operate and maintain the treatment works facilities, both fixed and variable. Energy costs can be escalated.
5. Revenue Generated = Income from the treatment works operation (e.g., any crops produced, biosolids sold as fertilizer, power generated, etc.).
6. Salvage Value = The value of treatment works facilities at the end of the planning period. Facilities with a useful life that exceeds the planning period (except land) should be straight-line depreciated.
7. Discount Rate = The real discount rate set by the Office of Management and Budget for the year in which project planning began. This rate should be used for cost-effectiveness analysis only. The real discount rate does not include an inflation premium.

KEYS:

1. All costs (except sunk costs) must be included, both eligible and ineligible.
2. Evaluation should not be done on a per-user basis but on the total project costs.
3. Each alternative must address the need that is identified in the project plan.
4. Alternatives must be equivalent. Each alternative must serve the same immediate customers and provide the same end-of-planning-period capacity.

PROCESS:

1. Determine the present worth of construction and OM&R components:

- a. One-Time Expenditures = Capital Costs

$$PW = F \times 1/(1 + i)^n$$

F = the future value = the estimated project cost

n = the number of years

i = the discount rate

(= single payment present worth factor)

- b. Recurring Equal Expenditures = OM&R Costs

$$PW = A \times [((1 + i)^n - 1)/i(1 + i)^n]$$

A = the annual expenditure

n = the number of years

i = the discount rate

(= uniform series present worth factor)

- c. Recurring Escalating Expenditures = Energy Costs (if applicable)

$$PW = G \times [(1 + i)^{n+1} - (1 + ni + i)/i^2(1 + i)^n]$$

G = the uniform increasing amount

n = the number of years

i = the discount rate

(= gradient series present worth factor)

2. Combine the present worth of the construction and OM&R components.
3. Determine the salvage value and the present worth of the salvage value.
4. Determine the present value of capitalized interest and revenue generated, if appropriate.
5. Total Present Worth will be the present worth of the salvage value combined with the present worth of revenue generated subtracted from the present worth of capital costs, OM&R components, and capitalized interest.