Present Value of an Escalating Yearly Cost

Present value, total and levelised yearly equivalent of a cost that grows at a fixed escalation rate each year, such as fuel or energy, over a life.

Method: Geometric gradient series (engineering economics; Newnan, Engineering Economic Analysis)

Input parameters

Unit system: SI

Parameter	Value	Unit
Cost in the first year (your currency)	1,000,000	
Escalation per year	5.0000	%
Discount rate	10.000	%
Number of years	15.000	

Calculated results

Parameter	Value	Unit
Present value of all the costs	1.0046e+07	
Total of the costs, not discounted	2.1579e+07	
Cost in the last year	1,979,932	
Levelised (equal) yearly cost with the same present value	1,320,841	

Notes for this case

- Costs paid at the end of each year, the first one year from now.

Formula and method

$$PV = C_1 \frac{1 - \left(\frac{1+g}{1+i}\right)^n}{i-g} \quad (i \neq g), \quad PV = \frac{nC_1}{1+i} \quad (i = g)$$

$$\Sigma C = C_1 \frac{(1+g)^n - 1}{g}, \quad C_n = C_1(1+g)^{n-1}, \quad C_{lev} = PV \cdot \frac{i(1+i)^n}{(1+i)^n - 1}$$

Variables

C_1	Cost in the first year (your currency)	-
g	Escalation per year	-
i	Discount rate	-
n	Number of years	-
PV	Present value of all the costs	-
ΣC	Total of the costs, not discounted	-
C_n	Cost in the last year	-
C_{lev}	Levelised (equal) yearly cost with the same present value	-
CRF	Capital recovery factor	-

Method and standards

The present value of a geometric gradient series with end-of-year payments; the levelised amount uses the capital recovery factor.

Assumptions and limits

- End-of-year payments; constant rates.

References

- Geometric gradient series (engineering economics; Newnan, Engineering Economic Analysis)

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/economics/escalating-cost-present-value

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.