OpsPilot

Cost-Benefit Analysis — User Manual

Decision-Ready Financial Discipline · HM Treasury Green Book · AI Engineering Co-Pilot

What this guide covers — what a CBA is, how the OpsPilot module builds one, what to have ready, and the document you receive.

1. What is a cost-benefit analysis?

A cost-benefit analysis (CBA) puts a capital decision on a defensible financial footing — discounting all the costs and benefits over the asset's life to a common basis and producing the decision metrics: Net Present Value, Benefit-Cost Ratio, internal rate of return and payback. The discipline matters because money now is worth more than money later, and because a decision based on undiscounted totals or optimistic single-point estimates is how bad capital decisions get justified.

OpsPilot follows *HM Treasury Green Book and ISO 15686-5 life-cycle costing*, discounts at the Treasury social discount rate, runs sensitivity analysis with switching values, and applies optimism bias per HMT supplementary guidance.

2. What the OpsPilot module does

Role	Responsibility
🎯 **AI Coach (OpsPilot)**	Builds the discounted cash flow and computes NPV / BCR / IRR / payback, runs sensitivity analysis with switching values, and applies optimism bias — “the maths is mine; the inputs are yours.”
👷 **Investment Analyst / Engineer / Sponsor (you)**	Provide the costs, benefits, asset life and discount-rate selection, and the business question the CBA must answer — and validate the analytical perspective and recommendation.

3. What you will be asked — have this ready

- The business question and the options being compared.
- The costs — capital, operating, life-cycle and decommissioning.
- The benefits — cash and non-cash, quantifiable and qualitative (Green Book Annex 2).
- The asset life and the discount rate to apply.

4. The metrics it produces

Metric	What it tells you
NPV	Net present value — the discounted value created (positive = worth doing).
BCR	Benefit-cost ratio — benefits per dollar of cost (>1 = benefits exceed costs).
IRR	The discount rate at which NPV = 0 — compare to your hurdle rate.
Payback	How long until cumulative benefits cover the cost.

5. What you receive — the output

A complete Cost-Benefit Analysis (Word): the scope and question, methodology, options, the full cost and benefit identification, the discounted cash flow with NPV/BCR/IRR/payback, sensitivity analysis with switching values, optimism-bias adjustment and a clear recommendation.

6. Worked example (illustrative)

A reliability upgrade costs $2M now and saves an estimated $400k a year in avoided downtime over a 15-year life. Undiscounted, that looks like a 5-year payback and an easy yes. The CBA discounts those future savings to present value — money in year 12 is worth far less than money now — and the NPV is positive but smaller than the naive sum suggests. Sensitivity analysis finds the switching value: the saving would have to fall below ~$220k/year before the NPV turns negative, which tells the decision-maker how much margin the case has. Optimism bias is applied to the benefit estimate, because reliability savings are routinely overstated. The result is a number the board can trust, with its sensitivities visible.

7. Getting the best result

- **Discount everything.** Undiscounted totals flatter long-dated benefits and mislead the decision.
- **Find the switching values.** Knowing what would have to change to flip the decision is the most useful output.
- **Count life-cycle costs.** Capital is only part of it — operating and decommissioning costs matter.
- **Apply optimism bias.** Benefits are routinely overstated; the adjustment keeps the case honest.