RESOURCE

Payback, NPV, and ROI Are Different Questions

Every RetrofitROI engine reports at least one of three numbers: a payback period, a net present value, or occasionally a percentage return. They sound interchangeable and they are not. Each one answers a specific question, and using the wrong one to decide a purchase can quietly change the answer.

Payback answers "when do I get my money back?"

Simple payback divides your net cost by your annual savings. It is the number most people reach for first because it is intuitive: a $6,000 project saving $600 a year pays back in ten years. It says nothing about what happens after that, and it treats a dollar saved next year the same as a dollar saved in year fifteen, which is not strictly true once you account for the time value of money.

NPV answers "is this worth it in today's dollars?"

Net present value discounts every future year of savings back to today using a discount rate you choose, then subtracts your net cost. A positive NPV means the project clears that bar after accounting for the fact that money now is worth more than the same money later; a negative NPV means it does not, even if the simple payback looked reasonable. The solar NPV engine and the heat-pump water heater payback engine both let you set the discount rate yourself rather than assuming one for you.

ROI answers "how big was the return relative to what I put in?"

Return on investment is a percentage, total lifetime savings divided by net cost. It is the most useful when you are comparing two very differently sized projects, since a small, cheap upgrade can have a much higher ROI than a large one even though the large one saves more total dollars. RetrofitROI uses it sparingly for

exactly that reason: on its own, ROI can make a marginal small project look better than a genuinely strong large one.

Why the three can disagree

Consider a $2,000 upgrade saving $250 a year (8-year payback, high ROI over a long horizon) against a $15,000 upgrade saving $2,200 a year (about 6.8-year payback, lower ROI). The second project pays back faster and produces more total NPV over a 15-year horizon, even though its percentage return is smaller. If you only looked at ROI, you would rank the projects backwards.

A worked comparison

The heat-pump water heater payback engine and the attic insulation payback engine both report simple payback by default. Run the same project through the NPV engine style of calculation with your ownership horizon and a realistic discount rate, and you get the more conservative view: does the project still clear once future dollars are worth less than today's.

When ownership horizon changes the answer

A project with a 12-year simple payback is a bad idea if you plan to sell your home in five years and a perfectly reasonable one if you plan to stay for twenty. NPV bakes your ownership horizon directly into the answer; payback alone does not, which is why RetrofitROI's engines ask for your ownership horizon as a first-class input rather than a footnote.

The RetrofitROI standard

Use payback for a fast first read. Reach for the NPV or discounted-payback version of an engine when the horizon is long, a loan is involved, or the simple payback is borderline. Treat ROI as a tiebreaker between projects of different sizes, never as the sole basis for a purchase decision on its own.