

# RETHINKING SIMPLE PAYBACK PERIOD



## SUMMARY

Simple payback period – defined as the number of years it would take to recover a project’s costs – is a metric commonly used to evaluate energy-efficiency and sustainability investments. While quick and intuitive, simple payback can lead to sub-optimal decision-making. By not incorporating important aspects such as the time value of money, cash flows after the payback period, and how a property’s lease allocates the costs and benefits of an efficiency project, simple payback provides an incomplete view of an investment’s financial return.

## IN DEPTH

When it comes to deciding which investments get funded, the first question most managers ask is, “What’s the simple payback period?” A quick calculation – dividing the initial costs of a project by the annual expected savings – simple payback period is the most widely used metric in capital budgeting. Determining the simple payback period can be useful if the main goal is quickly recapturing funds, or as a screening exercise to compare competing projects. However, placing too much emphasis on simple payback gives a limited view of a project’s economics and can result in missed opportunities.

Simple payback period ignores the impact of any cash flows that are received after the payback period – even though it is precisely those cash flows that determine the profitability of the investment. Take the case of two \$100,000 investments. Project A returns \$50,000 per year and nothing thereafter, while Project B returns \$25,000 per year for each of 10 years. Project B’s simple payback period may be twice as long as Project A’s; however, its capacity to generate far greater returns over its lifetime makes it the superior investment.

Additionally, simple payback period does not recognize the time value of money, treating each dollar that flows in or out as being equally valuable regardless of when the flow occurs. Assuming a market interest rate greater than zero, a dollar received today has greater value than a dollar received at some point in the future. Take two \$100,000 projects, each of which has a simple payback period of two years.

**FIGURE 1:**  
PROJECTS WITH IDENTICAL SIMPLE PAYBACK PERIOD CAN HAVE VERY DIFFERENT NET PRESENT VALUES DEPENDING ON THE TIMING AND DURATION OF CASH FLOWS

	SPP	NPV	TODAY	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	YR 9	YR 10
PROJECT A	2	(\$13,223.14)	\$ (100,000)	\$50,000	\$50,000								
PROJECT B	4	\$53,614.18	\$ (100,000)	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000

Note: Initial investment is made at beginning of Year 1, while savings are received at the end of each year.



**FIGURE 2:**  
**PROJECTS WITH IDENTICAL FIRST COST AND SIMPLE PAYBACK PERIOD CAN BE RANKED BY CALCULATING THE PV OF FUTURE CASH FLOWS**

	SPP	PV	YR 1	YR 2
PROJECT A	2	\$86,776.86	\$50,000	\$50,000
PROJECT C	2	\$82,644.63		\$100,000

Notes: Example assumes savings are received at the end of each year. PV calculation assumes a discount rate of 10%.

Project A returns \$50,000 at the end of each year, but Project C returns \$100,000 at the end of Year 2. Although both projects have the same simple payback period, Project A is clearly superior to Project C. Project A's returns have a higher "present value" because the first \$50,000 is returned twelve months earlier when those dollars are worth more.

Another consideration when evaluating expense-reducing investments is the likelihood of receiving one or more future cash flows – or the risk that those cash flows may disappear over time. In many cases, the probability of receiving projected cash flows varies over the lifetime of an investment, a

nuance that exceeds the capabilities of a simple payback calculation. For example, uncertainties regarding future energy prices, the operating performance of a capital project and the persistence of energy-saving behavior can impact whether estimated savings are actually realized. Managers who value the ability to factor risks such as these into their decision-making favor more sophisticated approaches, such as discounted cash flow modeling.

In many real estate firms, there is often a "rule-of-thumb" for capital investment decisions – such as only pursuing projects that are "less than two-year simple payback." Having such a rigid threshold for project approval seems arbitrary when factoring in market conditions, organizational hurdle rates, or the holding period of a building. Many managers will deny approval for an energy-saving project whose simple payback period exceeds this "rule-of-thumb" without realizing that competing investment opportunities offer far lower rates of return. In fact, this obsession with a two-year payback threshold persists despite significant variation in both market interest rates and the rates of return offered by other investments over the last several decades.

**FIGURE 3:**  
**THE SIMPLE PAYBACK PERIOD THAT A LANDLORD SEES WILL DEPEND ON HOW A PROJECT'S FIRST COST AND SAVINGS ARE ALLOCATED BETWEEN LANDLORD AND TENANT**

	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	YR 9	YR 10
<b>LANDLORD RECEIVES ALL SAVINGS</b>										
First cost	\$ (100,000)									
Total annual savings	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
Landlord's SPP:	2									
Landlord's NPV:	\$207,228.36									
<b>LANDLORD SHARES SAVINGS WITH TENANT</b>										
Landlord's portion of savings	50%	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
Tenant's portion of savings	50%	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
Landlord's SSP:	4									
Landlord's NPV:	\$53,614.18									
<b>LANDLORD RECOVERS TENANT'S SHARE OF SAVINGS</b>										
Landlord's portion of savings	50%	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
Cap Ex recoveries that offset tenant's savings		\$25,000	\$25,000	\$25,000	\$25,000					
Landlord's total annual cash flows		\$50,000	\$50,000	\$50,000	\$50,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
Landlord's SPP with Cap Ex recoveries:	2									
Landlord's NPV:	\$132,860.81									

Notes: Example assumes that the initial investment is made at the beginning of Year 1, while savings are received at the end of each year. NPV calculation considers all listed cash flows and assumes a discount rate of 10%. Lease language, tenant turnover and other factors ultimately determine the magnitude and duration of recoveries in the final scenario.

A simple payback period is only as accurate as the costs and benefits that were used to calculate it. It is impossible to compute a project's simple payback period unless the values used for the numerator and denominator reflect a project's true costs and savings, respectively. For example, a project's first cost should be reduced by the amount of any rebates or other incentives received, such as a utility energy-efficiency incentive or a potential tax credit. Failure to do so overstates the length of time necessary to recover that investment.

When evaluating investments made in landlord/tenant settings, properly calculating the simple payback period is rarely simple. In the case of a project that would reduce energy costs in the building, any capital expense reimbursements that the leases permit the landlord to collect from tenants should be recorded as additional cash inflows. These assessments help reduce the project's simple payback period when viewed from the landlord's perspective. One should also consider how the leases would allocate the estimated savings between the landlord and tenants. If the leases allow the tenants to keep a portion of the savings, those dollars must be excluded when calculating simple payback period from the landlord's perspective.

On the other hand, the landlord's share of savings could affect the property's net operating income (NOI) and asset value. According to the Income Approach to Appraisal, an incremental dollar of NOI supports an incremental \$10 in asset value at a capitalization rate of 10%. (This assumes that the NOI increase is persistent enough to be factored into the appraisal when the property is refinanced or sold.) If the landlord's share of savings were verified (and persistent), such an increase in appraised value alone could exceed the landlord's original investment in the energy-saving project, generating a simple payback period that could be measured in days rather than years.

#### THE BOTTOM LINE:

- Simple payback calculations often provide a quick but limited view of the financial performance of an investment.
- Simple payback does not consider time value of money, split incentives defined in leases, or other risks and uncertainties common in capital decisions.
- Given the complexity of properly allocating the costs and benefits of expense-reducing capital projects in landlord/tenant settings, and the impact that energy savings can have on a property's net operating income and asset value, any calculation of simple payback should be supplemented with more robust financial metrics, such as internal rate of return, net present value, and/or life-cycle cost.

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