

A Look Inside the ENERGY STAR® Cash Flow Opportunity Calculator: Calculations and Methodology

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efficiency.



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Introduction

The purpose of this document is to “show the math” behind EPA’s ENERGY STAR® [Cash Flow Opportunity Calculator](#) and to explain the logic behind each individual tab.

The Cash Flow Opportunity (CFO) Calculator was originally developed to address the, “*We don’t have the money!*” objection many organizations face when trying to implement energy efficiency projects, and to help facility managers translate energy savings into a language everyone can understand: dollars. It also uses common financial arguments, such as **present value** and **net present value** calculations, which should be familiar to financial managers. The CFO Calculator is the direct result of proven field experiences and can help decision makers calculate the cost of delaying the installation of energy efficiency projects and allow them to move forward with the installation of energy efficiency projects.

The purpose of this MS Excel spreadsheet is to help decision-makers quantify the costs of delaying an energy efficiency project by addressing three critical questions:

1. How much new energy efficiency equipment can be purchased from the anticipated savings?
2. Should this equipment purchase be financed now or is it better to wait and use cash from a future budget?
3. Is money being lost by waiting for a lower interest rate?

This spreadsheet is meant to translate energy savings into dollar figures to facilitate discussions with financial managers and demonstrate how implementing energy efficiency projects improve cash flow: the life blood of all organizations.

Share your experiences

The calculations in the ENERGY STAR Cash Flow Opportunity Calculator have successfully convinced many decision makers that delaying the installation of energy efficiency projects can be costly. Help others by sharing how your organization has successfully used the tool!

Please send comments to Katy Hatcher, U.S. EPA, ENERGY STAR Public Sector National Manager at Hatcher.Caterina@epa.gov.

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The CFO Calculator follows the logic outlined above across six individual tabs, including an INSTRUCTIONS tab, four data entry tabs, and a SUMMARY REPORT tab. The data entry tabs include DATA ENTRY, INVESTMENT VALUES, CASH FLOW, and INTEREST RATES. Each data entry tab addresses a specific calculation, and the results of that calculation are then used in subsequent tabs. The data entry tabs are designed to work both together and independently to test different scenarios.

DATA ENTRY

The DATA ENTRY tab determines how much money could be saved in the current operating budget by implementing a proposed energy efficiency project. This worksheet will convert the energy efficiency project savings from, for example, therms and kWh, into dollars, which are then used throughout the remaining tabs.

Figure 1: Example of the CFO Calculator's DATA ENTRY tab.

ENERGY STAR®
Cash Flow Opportunity Calculator
HELP
User Generated Categories - DATA ENTRY TABLE

Name

Select type of analysis

Values

Changing the options in these menus will delete user entered values!

User Generated Categories	SF	Annual energy costs (\$) - all fuel types	\$/SF	Savings target (%)	Potential annual savings
More efficient facility(s)	200,000	\$300,000	\$1.50	15.00	\$45,000
Less efficient facility(s)	800,000	\$1,700,000	\$2.13	30.00	\$510,000
Total					
Total SF	1,000,000	Total energy costs (\$) - all fuel types \$2,000,000	\$/SF \$2.00	Weighted savings target (%) 27.75%	Total potential annual savings (\$) \$555,000

ENERGY STAR® does not guarantee that your project will generate the results presented herein. An investment grade audit performed by a qualified engineering organization is required to determine the actual size of your savings opportunity.

The *Select type of analysis* dropdown menu provides a variety of energy project options to choose from. Your selection will modify the language used throughout the CFO Calculator to match your individual energy project:

- *User Generated Categories* is a generic option that generates two-category rows and the ability to create labels that best describe projects (e.g., individual addresses or groups of properties).

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- *Benchmark Results from EPA's Portfolio Manager* allows data to be directly input from EPA's ENERGY STAR Portfolio Manager®.
- *Green Building Categories* allows data to be directly input from LEED®-EB O&M.
- *Water or Wastewater Treatment Plants* allows data to be input based on million gallons per day usage.
- *By Efficiency Project Type* is a technology-driven option (e.g., lighting, heating and cooling, retro-commissioning).
- *Manufacturing Facility* allows data to be input based on production (e.g., pounds of product).

For all options, you can overwrite the category name and data labels to best describe your individual energy project.

Clicking on the Sample Values menu will automatically insert sample data consistent with the type of analysis chosen. You can use this to populate the spreadsheet should you do not have the actual data ready for your project.

The only formula in this tab calculates *total potential annual savings*, or the weighted average, which blends the different measures being used to generate savings. This output will be leveraged in the Investment Values Tab.

INVESTMENT VALUES

The INVESTMENT VALUES tab can be considered a “reverse financial calculator” because it uses the savings estimate from the DATA ENTRY tab to calculate the amount of equipment and services that could be paid for using only current and future energy savings.

The *annual energy costs* and *potential annual savings* are carried over from the DATA ENTRY tab. If equipment is properly maintained over its lifetime, these savings should continue to accrue. Also, as energy prices increase over time, savings will increase as well. When reviewing financing requests, lenders consider the “source of repayment.” As long as the operating budgets are *not* reduced to reflect lower energy bills, the savings needed to cover the financing costs can be found in future operating budgets and become this source of repayment. This tab leverages the future energy savings to cover the financing costs needed to install the project today rather than delaying the installation.

“If the equipment is properly maintained over its lifetime, these savings should continue to accrue.”

Explanation of investment values calculation

To determine the total amount that can be financed using these savings, a simple **Present Value (PV)** calculation, found on all financial calculators and in Microsoft® (MS) Excel is used: $(=PV(i, nper, Pmt, FV))$

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- *(i)*: assumed interest rate per period,
- *(nper)*: term,
- *(Pmt)*: amount of the payment
- *(FV)*: future value, which is typically zero.

You also can enter available rebates and additional capital contributions.

Then, the **Calculate** button executes the PV calculation while adding rebates and other capital contributions to determine how many dollars are available for the project. Monthly payments are assumed for this calculation.

Figure 2: Example of the CFO Calculator's INVESTMENTS VALUE tab.

ENERGY STAR®
Cash Flow Opportunity Calculator
HELP SAMPLE VALUES
INVESTMENT OPPORTUNITY

Potential Annual Savings = Cash Flow Opportunity			
	More efficient facility(s)	Less efficient facility(s)	Totals
Annual energy costs	\$300,000	\$1,700,000	\$2,000,000
Potential annual savings	\$45,000	\$510,000	\$555,000

What Can \$555,000.00 of Annual Savings Buy?

Assuming an interest rate of	5	%	<div style="background-color: #66b266; color: white; padding: 10px; display: inline-block;">Reset</div>
Assuming a term of	7	Year(s)	
Savings used to pay energy/retrofit investments	90.0	%	

Additional funds such as rebates, etc. (if available) \$100,000

\$3,045,000

without increasing today's capital and operating budgets.
(Note: Savings calculated on a monthly basis).

NOTE: If the project cost is greater than the above savings will cover and additional capital contributions are unavailable, see how adjusting the term, percentage of savings used, and/or interest rate affects the total before reducing the project size, which may also affect savings.

Contribution that your operating budget can make towards energy improvements	3	/SF	Consider blending short- and long-term projects to maximize use of the savings.
Simple Payback	5	Year(s)	
	6	Month(s)	

If the energy savings must cover the entire project cost you can use this spreadsheet as a “financial engineering” tool. Should the energy savings be insufficient to cover the total project cost, and other sources of capital are not available, this tool allows you to adjust the financing structure (term, interest rate, and/or the percent of savings used), effectively increasing the PV until the project cost is covered. Interest rate variations can have a surprisingly low effect on the overall economics of the project when compared to changing the financing term and percentage of savings used.

Simple Payback is calculated using the project cost divided by the monthly financing cost (principal and interest). Because future energy savings are being used to pay for the energy efficiency project, financing is required to make this logic work.

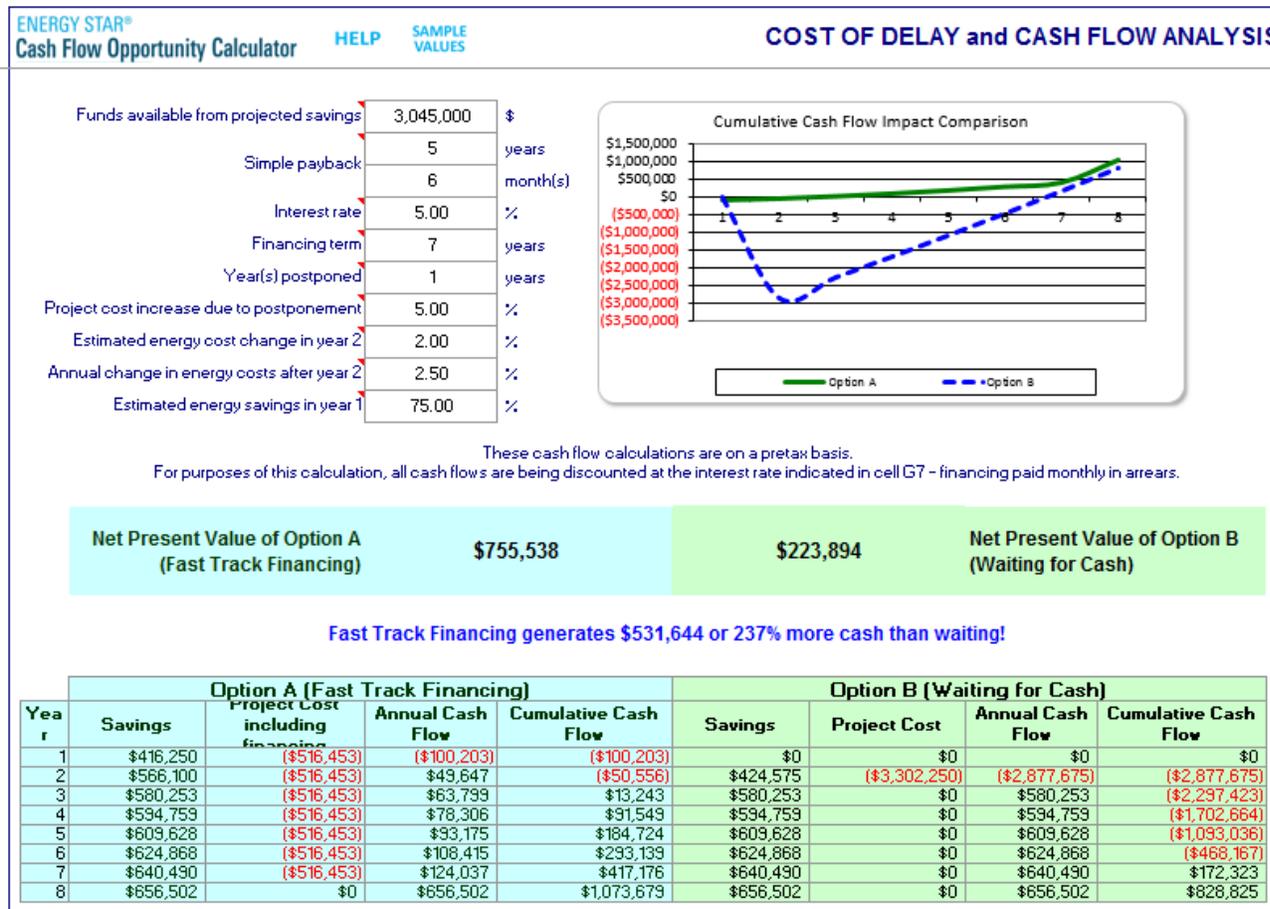
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CASH FLOW

The CASH FLOW tab addresses the common objections that financing may not be in the organization's best interests, and that paying interest will always increase project costs: "If it's not in the budget, we can't afford it, and we must wait until we can." Rather, this tab can help illustrate that financing the project immediately is often a better financial decision than postponing the installation, because it allows you to reduce energy waste sooner and redirect the energy savings towards reducing the project cost.

Figure 3: Example of the CFO Calculator's CASH FLOW tab.



Funds available from projected savings, Simple payback, Interest rate, and the Financing term data are carried forward from the INVESTMENT tab. To determine the cost of delay, enter the number of years that the project would have to be delayed if your organization waits for the capital budget to be available in Year(s) postponed. Because installation and energy costs change over time, add predictions of how much more the project (including both equipment and labor) will cost due to the delay in Year 2 in Estimated energy cost change in year 2 and after Year 2 in Annual change in energy costs after year 2. Adjust the percentage of savings that can be realized in Year 1 due to limitations in accessing the facility (e.g., students on campus) in

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Estimated energy savings in year 1 to see the cash flow impact on the first year's energy savings.

Explanation of financing options calculation

In the table at the bottom of the tab, the simple cash flows of two options are compared: *Option A: Fast Track Financing*, meaning moving forward with financing now, versus *Option B: Waiting for Cash*, meaning waiting until a future budget provides the funding needed to install the energy efficiency measures. The cash flow considerations are the same for both activities: they take the *Savings* and, if appropriate, subtract the *Project Cost including financing* to calculate the *Annual Cash Flow*. *Cumulative Cash Flow* for both *Option A* and *Option B* are simply the cumulative *Annual Cash Flows* for each year, which is used for tracking purposes only.

To discount the inflow/outflow of these two decisions back to their present value, a **Net Present**

Value (NPV) calculation is used:

$$NPV(i, N) = \sum_{t=0}^N \frac{R_t}{(1+i)^t}$$

- (*t*): time of the cash flow,
- (*i*): the discount rate (using the cost of borrowing as the opportunity cost), and
- (*R_t*): the net cash flow.

An equivalent calculation in MS Excel is used: (=NPV(*i*, *value1*, *value2*, etc.)) where (*i*) is the current annual interest rate, and the values found in the *Annual Cash Flow* columns for both *Option A* and *Option B*, starting with Year 1, are discounted. To show that the value of energy efficiency projects continues beyond the term of the financing, the number of years of the financing term, plus one year is discounted (although, in reality, the benefit continues throughout the life of the energy assets).

Changing energy costs over time (Year 1, Year 2, and beyond) is permitted, however, once the installation is finished, future cost increases or decreases will affect both options equally, as the value of future cash flows is the same. This means the real financial impact occurs early in the process, underscoring that often in energy efficiency projects, *time is of the essence*. By changing the value in *Years Postponed*, organizations with multi-year energy efficiency plans can evaluate the actual cost of delaying the installation of the projects for each delayed year.

The table presents a big picture comparison of the two financing options as annual snapshots. To get a more accurate picture of the actual comparison, you can create a comparison that breaks down the annual cash flows into monthly cash flows, reflects the energy savings realized along the way, and uses known energy cost increases as they occur.

The results of this comparison are often counterintuitive, but whichever decision generates the largest *Net Present Value* is generally accepted as the better financial decision. For most organizations, *Option A: Fast Tracking Financing* is the better option because the energy inefficiencies, or the money paid to the utilities for wasted or under-utilized energy, lost in Year 1

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of delay can be substantially greater than the Net Present Value of the financing costs during the entire term of the financing.

INTEREST RATES

A lower interest rate does not automatically make a financing option the better deal because the lower rate may not be immediately available; this is often the case with bonds and revolving loan funds. The INTEREST RATES tab compares two different interest rate offerings by adding the impact of the cost of delaying the installation (lost savings opportunity) caused by waiting for the lower interest rate financing. This comparison calculates how long you should wait for the option with the lower interest rate before this option actually becomes the more expensive financing option.

Many energy services companies and vendors offer readily available financing. When deciding whether to accept the offered financing, organizations often focus on interest rate comparisons, minimizing other terms and conditions. While the lower interest rate would be the best option if all the available financing options have similar terms and conditions and all options are immediately available, this is oftentimes not the case. When the lower interest rate option is not immediately available, in order to compare your options fairly, you need to add the cost of delay, or the unrecoverable energy inefficiencies paid to the utilities, into the calculation.

A real-world example

Real estate value is based on the cash flows generated by the property, and because an energy efficiency project improves a property's cash flow, it also increases the property's value. Often, a Property Manager's performance and resulting bonus compensation is based on this cash flow.

So, say a lighting manufacturer proposes to install and finance an energy efficiency project for a Fortune 50 company. The company does not have the funds to finance the project within their current capital budget, so the initial reaction of the Property Manager is to say, "We will do better by waiting for internal funding to become available," but the Property Manager knows that waiting will cause a ten-month delay in the installation. The Property Manager uses the INTEREST RATES tab to demonstrate how because of the money that would have to be paid to the utilities for wasted or under-utilized energy during the delay period, the higher interest rate financing, which is available immediately, will actually turnout to be a better cash flow decision than waiting for the lower rate financing. The Property Manager decides to accept the lighting manufacturer's offer and take the financing that is available immediately. This decision improves the operating revenues sooner, eventually results in an increased property value and potentially a higher bonus for the Property Manager!

Explanation of interest rate table

The INTEREST RATE tab calculates the overall financial difference between two specific interest rates. As in the CASH FLOW tab, the calculation used to create the comparison is **Present Value**. By calculating the difference between the monthly payments of the two rates

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(with the assumption that both financing options will be available at the same time), and then by discounting the difference over the term of the financing, the present value benefit of the lower rate offering can be quantified. The goal is to show you the financial savings that can be gained by using the lower interest rate, all other inputs being equal.

Figure 4: Example of the CFO Calculator's INTEREST RATES tab.

ENERGY STAR® Cash Flow Opportunity Calculator			HELP	SAMPLE VALUES	COST OF DELAY - Comparative Interest Rate Analysis			
Interest rate of higher financing	5.00	%						
Expected lower interest rate	4.00	%						
Cost of the equipment	\$3,045,000							
Simple payback	5	year(s)						
Potential annual savings	\$555,000							
Term of financing	7	year(s)						
Lower interest rate savings*	\$103,600							
Amount lost in utility bills	\$46,250	/month						
Break-Even Point	2.2	month(s)						
					Month	Lower Interest rate savings balance at beginning of month	Amount lost in monthly utility bills	Lower Interest rate savings balance at end of month
					1	\$103,600	\$46,250	\$57,400
					2	\$57,400	\$46,250	\$11,100
					3	\$11,100	\$46,250	(\$35,100)
					4	(\$35,100)	\$46,250	(\$81,400)
					5	(\$81,400)	\$46,250	(\$127,600)
					6	(\$127,600)	\$46,250	(\$173,900)
					7	(\$173,900)	\$46,250	(\$220,100)
					8	(\$220,100)	\$46,250	(\$266,400)
					9	(\$266,400)	\$46,250	(\$312,600)
					10	(\$312,600)	\$46,250	(\$358,900)
					11	(\$358,900)	\$46,250	(\$405,100)
					12	(\$405,100)	\$46,250	(\$451,400)

*Lower interest rate savings number is calculated by taking the NPV of the difference between the two monthly payments (immediate versus lower financing rates), discounted at the lower interest rate.

This savings amount, or the *Lower interest rate savings*, is transferred into the top of the monthly table. The *Potential annual savings* is pulled from the DATA ENTRY tab. You can quickly see the number of months you can wait before the benefit of the lower rate has been depleted when the energy savings are spread out equally over a 12-month period. The table on the right shows the break-even point, or how many months it takes before the higher interest rate becomes the better financing option. Again, the results can often appear counterintuitive.

SUMMARY REPORT

The SUMMARY REPORT tab compiles all the previously entered data and generates a report that can be shared with decision-makers. You can also print out the individual tab or tabs that best reflect the motivations for implementing an energy project without further delay.

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The INVESTMENT VALUES, CASH FLOW, and INTEREST RATES tabs are designed to work both together and independently to allow users to test different scenarios. To avoid inconsistent results in SUMMARY tab, please change the values at its first appearance. For example, financing information such as financing term or interest rate can be modified in INVESTMENT VALUES, CASH FLOW, and INTEREST RATES tabs, but we recommend modifying these values in the INVESTMENT VALUES tab where they first appear because changing these values in other tabs would most likely cause inconsistent results in the SUMMARY tab.

Figure 5: Example of the CFO Calculator's SUMMARY REPORT tab.

Cash Flow Opportunity Calculator

Know when to finance energy efficiency projects

Version 2.2 - 2018

SUMMARY OF FINANCIAL CALCULATIONS: User Generated Categories

Name: Sample Facility

Selected Scenario: User Generated Categories

The CFO Calculator tabs are designed to work independently and together as a whole. Results on this summary page are brought from different worksheets. If you have modified some of the values carried over from previous tabs, the results presented in this report may not be consistent.

This information has been generated by an MS Excel® spreadsheet developed by ENERGY STAR® called the Cash Flow Opportunity Calculator. The purpose of the calculator is to help address three critical questions about installing energy efficiency projects:

1. How much new energy efficiency equipment can be purchased from the anticipated savings?
2. Should this equipment purchase be financed now or is it better to wait and use cash from a future budget?
3. Is money being lost by waiting for a lower interest rate?

1. How much energy efficiency equipment can be purchased?
 This section reflects the cost per square foot by building category, as follows:

	SF	Annual energy costs (\$) - all fuel types	\$/SF	Savings target (%)	Potential annual savings
More efficient facility(s)	200,000	\$300,000	\$1.50	15.0	\$45,000
Less efficient facility(s)	800,000	\$1,700,000	\$2.13	30.0	\$510,000

	Total SF	Total energy costs (\$) - all fuel types	\$/SF	Weighted savings target (%)	Total potential annual savings (\$)
Total	1,000,000	\$2,000,000.00	\$2.00	27.75%	\$555,000

Redirecting funds from the existing utility budget by the "Savings Target" number, will free up about \$555,000.00 per year, which then can be used to finance the energy efficiency projects.

Our estimates indicate that, by using 90% of estimated savings and assuming financing costs of 5% (interest) over 7 years, the energy dollars saved can pay for: \$3,045,000.00 worth of equipment, with a simple payback of 5 years and 6 month(s). Note that these funds are from existing operating (utility) budgets and not from the capital budget.

2. Finance now or wait to include in a future budget?

Installing the equipment today means that the savings begin to accrue immediately. As long as the financing costs are lower than the energy savings, positive cash flow will be created.

When funds are not readily available, a frequently asked question is whether the energy saving project should be installed immediately and financed ("pay-as-we-use" philosophy), or if would it be a better decision to wait until the funds become available in a future budget ("pay-as-we-go" philosophy). Naturally, if we wait until money is budgeted, interest payments can be avoided altogether, but we lose the savings during this waiting period. To evaluate this decision, we use a discounted net-present-value analysis of the cash flows resulting from these two decision points using the financing terms and interest rate stated above, along with the following assumptions:

(a) The project costs will increase due to increased labor and material costs by:	5.0%
(b) Energy costs will increase next year by:	2.0%
(c) Energy costs will increase an average thereafter and throughout the financing period by:	2.5%
(d) The project will capture the first year energy savings due to estimated construction delays by:	75.0%

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