A Look Inside the Cash Flow Opportunity (CFO) Calculator:
Calculations and Methodology

Background

The Cash Flow Opportunity (CFO) Calculator was developed to address the "we don't have the money" objection that many organizations face when trying to implement energy efficiency projects, and to help facility managers translate energy savings into "financial speak." It is the result of proven field experiences that have been used to sell energy efficiency projects to decision-makers around the country. It uses simple financial arguments familiar to all financial managers.

This document was prepared in response to numerous requests by users to show the calulations at work behind the worksheets. It will explain the logic behind each worksheet and the reason why the worksheet is included in the package.

Data Entry Tab

HELP

User Generated Categories - DATA ENTRY TABLE

Name: **Sample Facility Data Set**

Select type of analysis: User Generated Categories

Values: Sample Values

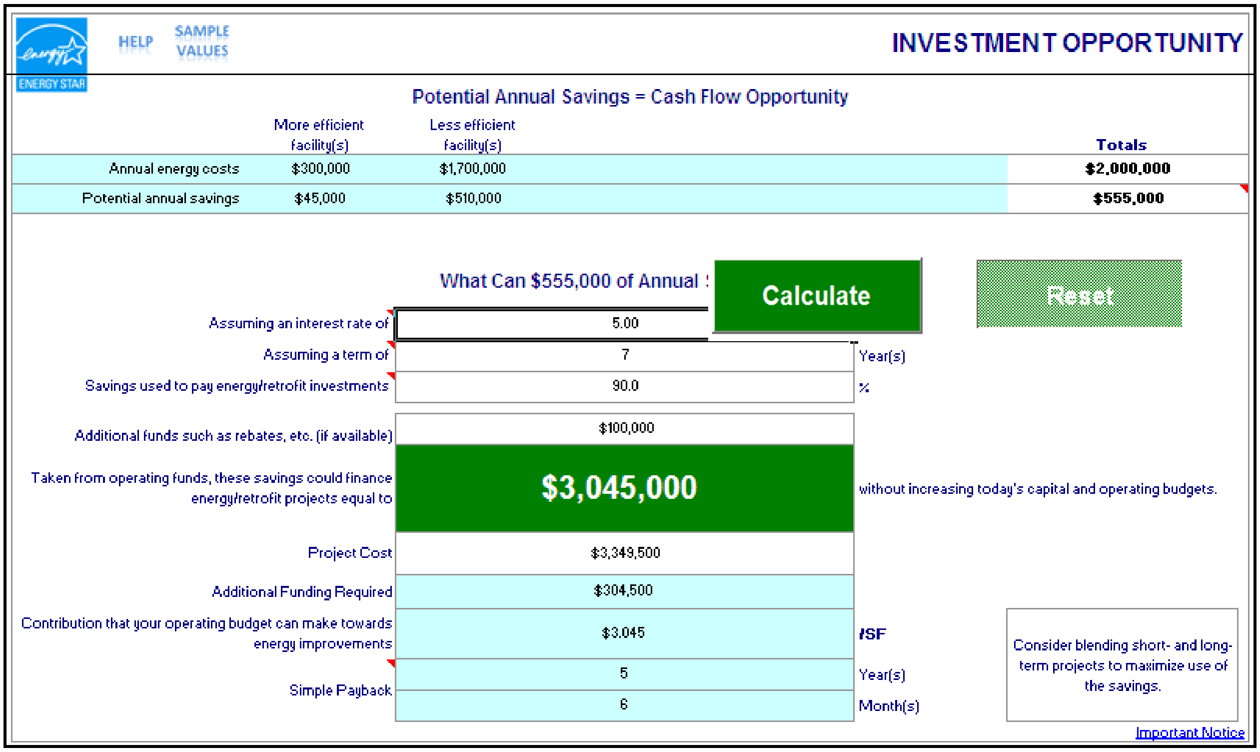
User Generated Categories	SF	Annual energy costs ($) - all fuel types	$/SF	Savings target (%)	Potential annual savings
More efficient facility(s)	**200,000**	**$300,000**	$1.50	**15.00**	$45,000
Less efficient facility(s)	**800,000**	**$1,700,000**	$2.13	**30.00**	$510,000

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

The purpose of the Data Entry tab is to determine how many dollars can be saved from the current operating budget by implementing the proposed energy efficiency project. This screen converts the project's energy savings (in units of therms or kWh) into a dollar amount, which is then used throughout the remaining worksheets.

Opening the "**Select type of analysis**" dropdown arrow (row 5) provides a variety of interface screens that reflect the nature and language of the energy project (whole building, LEED, wastewater, individual technology, etc.). The type of analysis selected acts as the "translator" from the technical project into dollar savings and the spreadsheet. The only calculations used here are "weighted average" calculations, blending the different measures used to generate the savings. This "**total potential annual savings**" number (lower right on the worksheet) will be leveraged in the next tab.

Investment Values Tab



It is presumed that these energy savings are ongoing, and that the equipment will be properly maintained over its useful life. As long as the operating budgets are not reduced to reflect the new, lower energy bills, the proposed savings will be found in future operating budgets. These savings can be considered the “source of repayment” of the financing needed to install the projects now, rather than having to wait for future funding, which can delay the project. In other words, we are “leveraging” the future energy savings to repay the financing needed to install the project today. Because we are leveraging the future energy savings to pay for the energy efficiency project, financing is required to make this logic work.

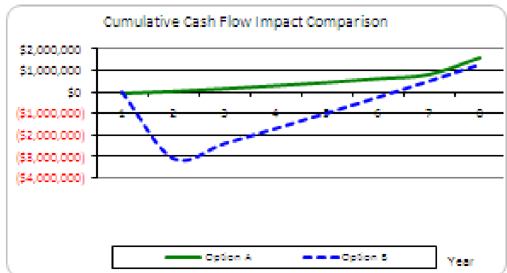
The math used is a simple Present Value (PV) calculation, found on all financial calculators and in Microsoft Excel® (=PV(i,nper,Pmt,FV). To perform this calculation, we need to know the assumed interest rate (i) per period, term (nper), payment (Pmt), and future value (FV). The spreadsheet offers input lines to enter available rebates and the total project cost. Pressing the green “**calculate**” button executes the PV calculation, adds in rebates, and compares the total against the project cost. If the energy savings are insufficient to cover the entire project cost and other sources of capital are not available, this sheet allows the user 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. Users are often surprised to see how interest rate variations have little effect on the overall economics of the project.

Cash Flow Tab

HELP SAMPLE VALUES

COST OF DELAY and CASH FLOW ANALYSIS

Project cost	3,349,500	$
Simple payback	5	years
	6	month(s)
Interest rate	5.00	%
Financing term	7	years
Year(s) postponed	1	years
Project cost increase due to postponement	5.00	%
Estimated energy cost change in year 2	10.00	%
Annual change in energy costs after year 2	2.50	%
Estimated energy savings in year 1	75.00	%



These cash flow calculations are on a pretax basis.
For purposes of this calculation, all cash flows are being discounted at the interest rate indicated in cell G7 - financing paid monthly in arrears.

Net Present Value of Option A (Fast Track Financing)	$1,119,896	$533,537	Net Present Value of Option B (Waiting for Cash)

Fast Track Financing generates $586,359 or 110% more cash than waiting!

	Option A (Fast Track Financing)				Option B (Waiting for Cash)			
Year	Savings	Project Cost including financing	Annual Cash Flow	Cumulative Cash Flow	Savings	Project Cost	Annual Cash Flow	Cumulative Cash Flow
1	$457,875	($568,098)	($110,223)	($110,223)	$0	$0	$0	$0
2	$671,550	($568,098)	$103,452	($6,772)	$503,663	($3,621,975)	($3,118,313)	($3,118,313)
3	$688,339	($568,098)	$120,240	$113,469	$688,339	$0	$688,339	($2,429,974)
4	$705,547	($568,098)	$137,449	$250,918	$705,547	$0	$705,547	($1,724,427)
5	$723,186	($568,098)	$155,088	$406,005	$723,186	$0	$723,186	($1,001,241)
6	$741,266	($568,098)	$173,167	$579,172	$741,266	$0	$741,266	($259,975)
7	$759,797	($568,098)	$191,699	$770,871	$759,797	$0	$759,797	$499,822
8	$778,792	$0	$778,792	$1,549,663	$778,792	$0	$778,792	$1,278,614

Important Notice

This tab addresses the oft-expressed objection that financing is not in the organization's best interests, and that paying interest simply increases project costs. However, the act of financing is not inherently good or bad for an organization; rather, it is what the organization does with the resulting money that has positive or negative effects on the larger budget.

This tab compares the simple cash flows of the two options: financing now is compared to waiting until a future budget provides the funding needed to install the measures. The cash flow considerations are the same for both activities (savings minus project cost, including financing costs, if appropriate, equals annual cash flow). "**Cumulative Cash Flow**" for Options A and B is the total of the annual cash flows, and is used for tracking purposes only. The calculation used to compare the two options is the "**Net Present Value**" calculation, which discounts the inflow/outflow of these two decisions back to their present value. The formula is ***Rt / (1+i)t***, where ***t*** = time of the cash flow, = discount rate (the cost of borrowing is used as the opportunity cost), and ***Rt*** = net cash flow. Used here is the equivalent formula in Excel®: *(=NPV(i, value1, value2, etc.))*, where *i* = the current annual interest rate, and the values found in the Annual Cash Flow columns are discounted for both financing now and waiting, starting with Year 1. To demonstrate that the value of energy efficiency projects continue beyond the term of the financing, the number of years of the financing term is discounted, plus one year.

These calculations allow for escalating energy costs over time; once the installation is complete, these future cost increases affect both options equally, and the value of future cash flows are the same for both alternatives. In other words, the real financial impact occurs early in the process, underscoring that time is of the essence when dealing with energy efficiency projects.

This spreadsheet is simply a "big picture" annual snapshot of the decision whether to finance now or wait until a future budget provides the cash needed for the project. To get a more accurate picture of the actual comparison, the user can

create their own spreadsheet that breaks out the annual cash flows into monthly cash flows, reflects the energy savings realized along the way, and plugs in known energy cost increases as they occur.

The results of this comparison are often counter-intuitive to many. Installing now using financing is almost always the better financial decision—for most organizations, energy inefficiencies (money paid to the utilities for wasted or under-utilized energy) lost in one year of delay are substantially greater than the cost of financing during the entire term of the financing.

Interest Rate Tab

ENERGY STAR HELP SAMPLE VALUES

COST OF DELAY - Comparative Interest Rate Analysis

Interest rate of higher financing	5.00	%
Interest rate of a lower financing	4.00	%
Cost of the equipment	$3,349,500	
Simple payback	5	year(s)
	6	month(s)
Potential annual savings	$610,500	
Term of financing	7	year(s)
Lower interest rate savings*	**$114,000**	
Amount lost in utility bills	$50,900	/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	**$114,000**	$50,900	$63,100
2	$63,100	$50,900	$12,200
3	$12,200	$50,900	($38,700)
4	($38,700)	$50,900	($89,500)
5	($89,500)	$50,900	($140,400)
6	($140,400)	$50,900	($191,300)
7	($191,300)	$50,900	($242,200)
8	($242,200)	$50,900	($293,000)
9	($293,000)	$50,900	($343,900)
10	($343,900)	$50,900	($394,800)
11	($394,800)	$50,900	($445,700)
12	($445,700)	$50,900	($496,500)

*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.

Important Notice

This worksheet deals with the tendency of organizations to determine the "best financing offer" based on the lowest interest rate. Energy service providers and vendors frequently offer financing with their products and services. The tendency to evaluate the vendor financing against other financing options is often reduced to interest rate comparisons. However, waiting for lower interest rates often implies a delay in accessing the lower cost funds. To make an accurate comparison, one needs to reflect the cost of that delay (energy inefficiencies paid to the utilities) in the calculation, assuming the other terms and conditions are equivalent.

This worksheet calculates the interest rate comparison and incorporates energy inefficiencies into the computation. Again, the calculation used is a Present Value calculation. By calculating the difference between the monthly payments of the two interest rates, and (assuming the financing is available on the same day) discounting the difference between these two amounts over the term of the financing (using the lower interest rate as the opportunity cost), we can quantify the present value of the lower rate offering. This amount is noted as the "**Lower interest rate savings**" on the worksheet and transferred into the monthly table. The "**Potential annual savings**" in energy costs were calculated on the Data Entry Tab. Assuming that the energy savings are spread out equally over a 12-month period, we can easily compute the number of months the borrower can wait before the benefit of the lower rate has been depleted. The table on the right of the worksheet lays out the calculations.

Summary

The calculations included in this family of worksheets have proven themselves to be highly valuable in the field, and have been used to convince many decision-makers that delaying the installation of energy efficiency projects is a costly choice. These calculations contain two somewhat counterintuitive financial conclusions: (1) financing now is often better than waiting and paying no interest, and (2) interest rates are rarely the most important consideration when evaluation financing options. Properly explained, these conclusions can successfully change an organization's approach to energy efficiency projects, making immediate investments in energy savings a higher organizational priority.

We hope that you will share with us examples of how your organization has used this tool, so that others can learn from your experiences.

Please send any comments to Katy Hatcher, ENERGY STAR National Manager for the Public Sector, at Hatcher.Caterina@epa.gov.