



# ENERGYSTAR<sup>®</sup>

# Building Upgrade Manual





## INTRODUCTION

The ENERGY STAR® Upgrade Manual for Buildings is a guide for planning and implementing profitable upgrades that will improve the energy performance of your facilities. The Manual is a guide for developing a comprehensive energy management strategy and an integrated approach to upgrading existing buildings. It also provides information on proven energy-efficient technologies that can produce energy savings of 35% or greater by following the staged process outlined in the manual.

### ENERGY STAR Overview

ENERGY STAR is a dynamic voluntary government and industry partnership that makes it easy for businesses and consumers to save money and protect the environment. In 1991, the US Environmental Protection Agency introduced the Green Lights program, a voluntary program that encouraged organizations to upgrade their lighting to energy efficiency lighting systems and controls. The labeling program was launched the following year and the ENERGY STAR brand was introduced. The ENERGY STAR brand identifies energy-efficient products and promotes energy performance that saves energy and protects the environment. In 1996, EPA partnered with Department of Energy to increase the product offerings of the ENERGY STAR label. The label was expanded to include new homes, commercial and institutional buildings, residential heating and cooling equipment, major appliances, office equipment, lighting, and consumer electronics. Green Lights, ClimateWise, and all labeled products have been consolidated under one umbrella; ENERGY STAR. Now, the suite of products and offerings all bear the ENERGY STAR logo. From labeled buildings and homes to labeled products, the ENERGY STAR logo makes it easier for businesses and consumers to recognize the symbol for exemplary energy performance, saving money and pollution prevention.

### You Can Make A Difference

With ENERGY STAR, money isn't all you'll save! Whether your business is education, retail, manufacturing, or healthcare, you can profit from a new source of value by adopting energy management best practices that promotes exemplary energy performance in your buildings. If all US consumers and businesses were to choose ENERGY STAR products and building upgrade strategies over the next decade, the national annual energy bill would be reduced by about \$200 billion. Consumers and businesses would not only save money but would also make a huge reduction in air pollution and contribute to protecting the earth's atmosphere for future generations. ENERGY STAR has contributed to 6.4 million metric tons of carbon reductions and 31.6 billion kWh savings since the inception of its flagship program.

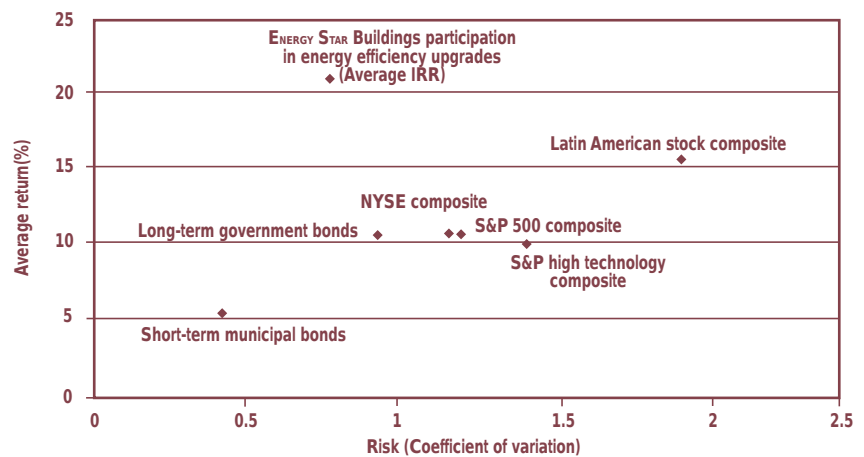


## Upgrading Your Buildings

Energy efficiency prevents pollution and is good for your bottom line as well as the environment. Your organization will save the money that was previously spent on energy-wasting equipment and technologies. Reductions in energy consumption also enable you to deliver products and services at a lower cost and increase profits, which means being more competitive. The potential savings from an integrated approach to energy-efficient upgrades can be 35% or greater. For example, energy bills for existing US commercial space (approximately 78 billion square feet) total \$110 billion annually. EPA estimates that increasing the energy efficiency of this space could save more than \$25 billion. In addition to dollar savings, there are several other benefits for incorporating energy efficiency into your business strategy:

- ENERGY STAR upgrades offer superior returns at a lower risk than many other investments (see Figure 1).
- Improvements in energy performance and employee comfort can increase productivity in your upgraded buildings; in fact, revenue generated from increased productivity can be 10 times as high as the energy cost savings received from performing upgrades.
- Every dollar invested in an energy-efficient upgrade can produce between \$2 and \$3 in increased asset value, which can make commercial properties more attractive to buyers and lenders.

Figure 1: Risk vs. Return



Improving energy performance offers long-term, low-risk returns, reductions in energy consumption and costs, increases in worker productivity, and improved asset value, few other investments can do all that. And each day that you delay your decision to upgrade, you lose those potential savings forever.



## An Integrated Upgrade Approach

An integrated upgrade approach is a formula for success that includes the following factors:

- Involving the right people in your organization — EPA encourages top management commitment and targets top level executives in promoting energy performance and pollution prevention.
- Benchmarking energy performance — EPA advocates benchmarking energy performance (EPA's portfolio manager) to optimize energy use and achieve maximum energy and cost savings, and using proven energy-efficient technologies and an integrated approach for building upgrades.
- Communicating results — EPA recognizes participants' successes to increase public awareness on the benefits of energy performance. Nothing is more convincing than success!

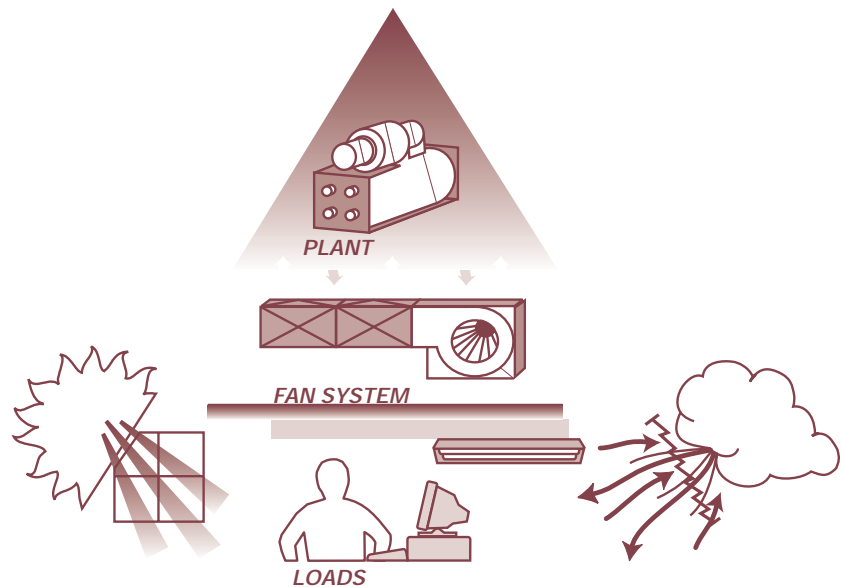
The rationale and approach to energy efficiency upgrades introduced below are designed to maximize your rate of return for energy-efficient investments.

Underlying the integrated approach for building upgrades is a basic understanding of how to improve energy performance. Figure 2 illustrates how heat and energy flow in a building. Heat is given off by lights, people, and other supplemental loads; such as office equipment requires space cooling. Solar radiation and hot outside air temperatures can also impact space cooling needs. Conversely, cold outside air temperatures create the need for heating. Even when it is cold outside, your building may still require some cooling to remove excess heat given off by lights, people and equipment.





Figure 2: Heat Flow In Buildings



#### Heat Flow In Buildings: Building Systems Interactions

Figure 2 shows the interaction of heating, cooling, and electrical loads with the HVAC equipment. Arrows indicate heat flow pathways. Reducing heating, cooling, and electrical loads reduces the demand on HVAC equipment, thus saving energy.

The staged approach synthesizes these interactions into a systematic method for planning upgrades that enables you to maximize energy savings. The stages are:

- **Recommissioning:** Periodically examine building equipment, systems, and maintenance procedures as compared to design intent and current operational needs.
- **Lighting:** Install energy-efficient lighting systems and controls that improve light quality and reduce heat gain.
- **Supplemental Load Reductions:** Purchase ENERGY STAR labeled office equipment, install window films and add insulation or reflective roof coating to reduce energy consumption of supplemental load sources.
- **Fan Systems Upgrades:** Properly size fan systems, adding variable speed drives, and converting to a variable-air-volume system.
- **Heating And Cooling System Upgrades:** Replace chlorofluorocarbon chillers, retrofit or install energy-efficient models to meet the building's reduced cooling loads, upgrade boilers and other central plant systems to energy-efficient standards.



When the staged approach is performed sequentially, each stage includes changes that will affect the upgrades performed in subsequent stages, thus maximizing energy and cost savings. The first three stages, Recommissioning, Lighting, and Supplemental Load Reductions, address reducing heating, cooling, and electrical loads. Once these loads are reduced, you can upgrade HVAC equipment to meet the current loads and optimize its performance. By implementing the load reduction strategies first, the savings from fans and HVAC systems will be greater because these systems can be properly sized to handle the reduced loads.

### **Build Your Building Right**

After many requests from our participants to help them achieve ENERGY STAR for new building projects, EPA has expanded its experience in energy performance for existing buildings to the new buildings arena. It has been documented that when high performance buildings are designed from the start, they are generally more efficient and cost less than upgrading after the fact. Buildings systems and materials can be designed as integral network that will improve energy performance.

ENERGY STAR provides guidance for design teams and building owners on new building design strategies to enhance energy performance. The New Building Design initiative is web based and will walk you through the design process and provide tools to help you make informed decisions about energy performance on new design projects. It starts with setting goals and ends with achieving the ENERGY STAR label for your building. It also address all other design phases from pre-design to construction and bid documents. Energy performance is the driving element in the discussion at each phase. It will help you identify or ask the question, “How will this design decision effect the energy performance of the building?”

Target Finder, a web based energy performance calculator, will help you set a target early in the process. You can also measure your progress along the way by comparing your simulated energy consumption to your target. The difference between the simulated and target can assist in determining relative efficiency, identifying gaps and making improvements to energy performance strategies. The benefit is that energy strategies are incorporated as an integral part of the design and can be compared to industry benchmarks to monitor progress toward reaching your energy performance goals.





## Get Started Now

You can become an ENERGY STAR partner and receive the benefits of membership! Your organization signs a Partnership Agreement stating that they are committed to improving energy performance by:

1. Measuring, tracking, and benchmarking energy performance using tools such as those offered by ENERGY STAR,
2. Developing and implementing a plan to improve energy performance in your facilities and operations by adopting the strategy provided by ENERGY STAR,
3. Educating your company and community about your achievements and partnership with ENERGY STAR.

EPA will provide you with resources and assistance; such as analytical software tools, publications, and technical guidance to assist you with achieving exemplary energy performance goals. You can learn more about the obtaining the suite of offerings from:

ENERGY STAR on the Web	<a href="http://www.energystar.gov">www.energystar.gov</a>
ENERGY STAR Hotline	1-888-STAR YES (1-888-782-7937)





## BUSINESS ANALYSIS

### Overview

Energy performance can increase the value of an organization by improving the bottom line. The bottom line in business is net income or earnings; reduced energy costs can be reflected in increased earnings and earnings per share. Every dollar of increased earnings can be valued at the prevailing market earnings multiple, or the Price Earnings Ratio. This approach to valuation is common practice among analysts, who routinely relate market prices for shares of stock to multiples of earnings. You can also use this approach to determine the value of energy performance for your business— that is, increased market capitalization. ENERGY STAR provides tools that quantify, justify and communicate the impact of energy performance to a company's worth.

The process to improved energy performance requires that the financial merits of opportunities be carefully evaluated. All organizations employ basic financial analysis tools to examine the value, risk, and liquidity impacts of investment opportunities competing for limited capital resources. To successfully compete against other business investments, energy performance should be evaluated on the same basis. Understanding basic financial concepts and using simple analysis tools can facilitate an informed decision.

This chapter explains the tools necessary to evaluate profitability, cash flow, and liquidity and presents a framework for using these tools to analyze building upgrade investments to improve energy performance.

### Capital Budgeting Basics

Both for-profit and not-for-profit organizations evaluate potential investments based on net income (bottom line). To evaluate net income, an organizations use financial analyses to identify whether an investment exceeds a predetermined hurdle rate while maintaining acceptable first cost and liquidity requirements. Profitability is measured by whether a project's internal rate of return passes the investment hurdle rate. Cash flow and liquidity are evaluated by first cost and payback.

- *First cost* is the up-front cost that is incurred before the investment generates any savings. Large first costs put stress on an organization's balance sheet and may cause an investment to be rejected, even if it is profitable in the long run.
- *Net present value (NPV)* is the total net cash flow that a project generates over its lifetime, including first costs, with discounting applied to cash flows that occur in the future. NPV indicates what a project's lifetime cash flow is worth today.
- *Simple payback* is the amount of time, in years, necessary for future cash flows to



return the original investment. Payback is an indicator of liquidity because it measures the speed with which an investment can be converted into cash. Payback is also used as an indicator of risk. As a general rule, short-term events can be predicted more precisely than events in the distant future. Therefore, assuming everything else is constant, projects with a shorter payback period are generally considered less risky.

- *Internal rate of return (IRR)* is the interest rate that equates the present value of expected future cash flows to the initial cost of the project. Expressed as a percentage, IRR can be easily compared with loan or hurdle rates to determine an investment's profitability.
- *Hurdle rate* is the accept/reject criterion for determining if an investment passes the profitability test. If the IRR is higher than the hurdle rate, the investment is profitable. Hurdle rates are the marginal cost of capital, adjusted for a project's risk. The higher the cost of capital and risk, the higher the required hurdle rate.

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#### Capital Budgeting Glossary

Cost of capital	The discount rate that is used in the capital budgeting process.
Discount rate	The interest rate used to discount future revenue streams.
Hurdle rate	The minimum acceptable internal rate of return for a project.
Internal rate of return	The interest rate that equates the present value of expected future cash flows to the initial cost of the project.
Net present value	The present value of the expected net cash flows of an investment, discounted at an appropriate percentage rate, minus the initial cost outlay of the project.
Simple payback	The number of years required to return the original investment from net cash flows.
Time value of money	Money received today is valued more highly than money received at a future date.

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### Net Income Analysis

Evaluating investment in long-term building projects requires tools that consider cash flow over the life of a project and account for the time value of money. Simple payback, although frequently used in the energy management industry, is not a good indicator of profitability because it does not consider returns beyond the payback period and ignores the time value of money. The most common tools to evaluate investments are IRR and NPV. IRR is used to compare a project's return against a hurdle rate to determine whether it meets financial criteria and worth pursuing. NPV is useful for comparing and prioritizing amongst competing projects. Together, they provide a comprehensive evaluation of a project's contribution to the bottom line.

In addition to evaluating investment returns, determining the financial value of energy performance investments and its effect on the bottom line is equally important. While NPV can be used to demonstrate today's value of an investment and future returns, understanding how energy performance can impact key financial and profitability metrics such as profit margin, earnings per share, net reserve, and



market capitalization should be considered in capital decision making. Valuing the incremental earnings that result from improved energy performance is a way to capture the true worth to an organization. ENERGY STAR has developed a financial value calculator (fvc) to analyze how energy performance projects can improve an organization's net income and corporate value. Visit ENERGY STAR Web site at [www.energystar.gov](http://www.energystar.gov).

## Financial Evaluation

ENERGY STAR encourages using energy performance measurement and/or equipment upgrades to maximize energy savings while improving building comfort and indoor air quality. The following framework provides a systematic approach to evaluating energy performance investments and can be applied to comprehensive building upgrades or new designs.

1. Prepare a cash flow analysis for each upgrade or design option.
2. Calculate IRR for each option. Determine each option's profitability against the hurdle rate.
3. Compare competing options and prioritize options within a package using NPV.
4. Maximize energy efficiency by packaging upgrade options or carefully integrating systems where appropriate.

## Business Analysis Process

### *Cash Flow Analysis*

Evaluating profitability with IRR and NPV requires the preparation of a cash flow analysis. A simple cash flow estimate (see Table 1) should be prepared for each potential energy-performance option suggested by an energy audit. Cash flow analysis can also be used to compare the theoretical performance of an efficient building design to that of a conventional design. This analysis lists the year-to-year costs and savings for all implementation, operation, maintenance, and disposal costs, and energy and demand savings, over the life of the equipment or building. For this demonstration the investment is evaluated over a period of 10 years. Each option generally has a first cost and a stream of cost savings. In our example, the first cost is the installation cost, which occurs in year zero. In the unusual case that the retrofit is planned over multiple years, provide an estimate of the cost for each year in which the work will be completed. Be sure to document the projected schedule in the list of key assumptions.

*Project energy cost savings.* Typically, an energy audit report converts your energy and demand savings into monetary savings based on your current energy rates and operating schedules. Similarly, computer energy simulation can estimate annual savings associated with an efficient design. If you anticipate energy price changes, you may want to adjust the amount of savings in future years. Also, for a multiyear



project, you will need to phase in the energy savings over the first few years as appropriate. Be sure to document the energy rates that are used for the calculation and the planned operating schedules in the list of key assumptions. In our example, the energy prices and operating schedules will remain constant over the 10-year life of the equipment.

Table 1: Cash Flow Analysis For LED Exit Signs

Year	Retrofit Cost	Energy & Demand Savings	Maintenance Savings	Omitted Savings	Risk Level
0	\$ 3,250	\$ 0	\$ 0	Neutral	Neutral
1	0	2,181	200		
2	0	2,181	200		
3	0	2,181	200		
4	0	2,181	200		
5	0	2,181	200		
6	0	2,181	200		
7	0	2,181	200		
8	0	2,181	200		
9	0	2,181	200		
10	0	2,181	200		

Key Assumptions:

1. Retrofit will be completed in 3 months.
2. LED exit signs have a 10-year life expectancy.
3. Energy savings are based on the current average energy rate of \$0.078/kWh.
4. No changes in energy rates will occur during the 10-year period.
5. Maintenance savings are realized because lamps are changed less frequently.

*Estimate the annual savings in maintenance costs.* In our example, we are replacing incandescent exit signs with LED signs, and can thus realize substantial savings in labor and materials over the life of the equipment. In some cases, an energy-efficient retrofit can require more maintenance than before, resulting in a negative maintenance savings entry. Document all key assumptions regarding maintenance savings.

*Provide qualitative guidance.* Additional savings or costs can be difficult to quantify. Potential savings that are hard to measure include worker productivity gains, increased sales attributable to the upgrade, and enhanced corporate image. Omitted savings/costs should simply be classified as having a negative, neutral, or positive influence on the net annual cash flow. For all six of the lighting options in the example, omitted costs/savings are neutral, even though evidence suggests that office lighting retrofits can increase worker productivity.

Classifying the risk level of the project can also be difficult. Because of uncertainty about future events (for example, future prices of electricity), anticipated cash flows may be difficult to estimate. However, compared with other investments that a



company may make, such as new product development, energy efficiency projects are still considered a low risk. If you do not know the risk levels of other investments your organization is considering, you may want to classify the risk of energy-efficient investments as neutral to be conservative.

Cash flow analyses for most options will follow this simple example, in which the initial cost occurs in year zero, savings estimates are constant over the life of the project, and risk and omitted cost/savings are neutral.

#### *Cash Flow Assumptions*

Estimating cash flow is the most difficult part of any financial analysis. While initial retrofitting or construction costs can be estimated based on experience, estimates of energy savings and operation and maintenance costs savings are based on more extensive assumptions that may be affected by numerous variables. Because future events may not occur as anticipated in your assumptions, the IRR realized for the project may vary considerably from your original estimate. Recognizing this uncertainty, you should explicitly list the assumptions underlying your cash flow estimates, and reach a consensus with other staff that these assumptions are reasonable. At a minimum, assumptions that should be documented are the future prices of energy and your basic operating conditions.

Taxes can also affect your cash flow estimates. Increasing depreciation, decreasing energy and maintenance expenses, and, if your project is debt financed, increasing the amount of your interest deduction can affect an organization's tax liability. If you are unfamiliar with these tax implications, simply omit them from your analysis and express your results in pre-tax terms.

#### *Profitability Test*

If all the options being considered have a single-payment first cost, cash flows that are uniform for the entire time horizon, and equal-length life spans, you can easily determine IRR using a calculator and Table 2. Using the table, a 20% IRR hurdle rate would result in a simple payback of 4.2 years, options with less than a 4.2-year simple payback would be considered profitable.

Calculate the IRR for each project, and simply compare it to your hurdle rate. If the option exceeds the established hurdle rate, that project would be considered profitable and should be pursued. IRR should be used to determine profitability for each project. It should not be used to compare or prioritize projects; this approach can minimize first cost rather than maximizing energy performance and long-term savings.



Table 2: Project IRR After Simple Payback

Payback (years)	Time Horizon (years)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.0	0.0%	61.8%	83.9%	92.8%	96.6%	98.4%	99.2%	99.6%	99.8%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%
1.5		21.5%	44.6%	55.2%	60.4%	63.1%	64.6%	65.5%	66.0%	66.3%	66.4%	66.5%	66.6%	66.6%	66.6%
2.0		0.0%	23.4%	34.9%	41.0%	44.5%	46.6%	47.8%	48.6%	49.1%	49.4%	49.6%	49.7%	49.8%	49.9%
2.5			9.7%	21.9%	28.6%	32.7%	35.1%	36.7%	37.8%	38.5%	38.9%	39.2%	39.5%	39.6%	39.7%
3.0			0.0%	12.6%	19.9%	24.3%	27.1%	29.0%	30.2%	31.1%	31.7%	32.2%	32.5%	32.7%	32.9%
3.5				5.6%	13.2%	18.0%	21.1%	23.2%	24.6%	25.7%	26.4%	26.9%	27.3%	27.6%	27.9%
4.0				0.0%	7.9%	13.0%	16.3%	18.6%	20.2%	21.4%	22.3%	22.9%	23.4%	23.7%	24.0%
4.5					3.6%	8.9%	12.4%	14.9%	16.7%	18.0%	18.9%	19.6%	20.2%	20.6%	20.9%
5.0					0.0%	5.5%	9.2%	11.8%	13.7%	15.1%	16.1%	16.9%	17.6%	18.0%	18.4%
5.5						2.5%	6.4%	9.2%	11.2%	12.7%	13.8%	14.7%	15.3%	15.9%	16.3%
6.0						0.0%	4.0%	6.9%	9.0%	10.6%	11.8%	12.7%	13.4%	14.0%	14.5%
6.5							1.9%	4.9%	7.1%	8.7%	10.0%	11.0%	11.8%	12.4%	12.9%
7.0							0.0%	3.1%	5.3%	7.1%	8.4%	9.5%	10.3%	11.0%	11.5%
7.5								1.5%	3.8%	5.6%	7.0%	8.1%	9.0%	9.7%	10.2%
8.0								0.0%	2.4%	4.3%	5.7%	6.9%	7.8%	8.5%	9.1%
8.5									1.2%	3.1%	4.6%	5.7%	6.7%	7.5%	8.1%
9.0									0.0%	2.0%	3.5%	4.7%	5.7%	6.5%	7.2%
9.5										0.9%	2.5%	3.8%	4.8%	5.6%	6.3%
10.0										0.0%	1.6%	2.9%	4.0%	4.8%	5.6%

### Prioritize Options

To compare two competing options or to prioritize options, a net present value (NPV) analysis should be used. NPV discounts the future total net cash flow over a project's life, and tells you what a project's future cash flow is worth in today's dollars. As with IRR, NPV is calculated by using a financial calculator or spreadsheet. Note that IRR and NPV are related, a negative NPV indicates that the option generates less than the established rate of return.

For example, you have the option of controlling lighting with a Central Time clock or individual occupancy sensors. Table 3, illustrates that the time clock has a higher IRR and quicker payback, but NPV analysis suggest that occupancy sensors would increase energy savings and net worth of your organization. Similarly, NPV can be used to prioritize and rank the value of options within a package of upgrades (see Table 4).

### Bundle Upgrades

What about options that are considered marginally profitable, but can still contribute to maximizing the energy efficiency of a project? In our example, improving office task lighting, when evaluated individually, does not meet our required hurdle rate. However, when task lighting is packaged with the other more profitable aspects of lighting upgrades, the combined project IRR still exceeds the hurdle



rate. By using an integrated approach, the task lighting can be included in the upgrade package and still meet investment criteria.

Table 3: Comparing The Profitability Of Upgrade Options

Year	Upgrade Option 1A Occupancy Sensors		Upgrade Option 1B Central Timeclock	
	Initial Cost	Savings Generated	Initial Cost	Savings Generated
0	\$ 42,000	\$ 0	\$ 9,000	\$ 0
1	0	12,200	0	3,550
2	0	12,200	0	3,550
3	0	12,200	0	3,550
4	0	12,200	0	3,550
5	0	12,200	0	3,550
6	0	12,200	0	3,550
7	0	12,200	0	3,550
8	0	12,200	0	3,550
9	0	12,200	0	3,550
10	0	12,200	0	3,550
<i>Cumulative Savings</i>				
Over Ten Years		\$ 122,000		\$ 35,500
Simple Payback		3.4 years		2.5 years
IRR		26%		38%
NPV		\$ 7,623		\$ 4,903

In another example, including a daylight dimming option would not be pursued, because it is not profitable both when evaluated on its own and as part of the overall upgrade package. Incremental costs alone should not dissuade the specifier from including an option that is marginally profitable. Options can be quantified in terms other than cost, particularly if the option can significantly improve aesthetics or lighting quality, or provide other non-tangible benefits.

### Other Considerations

Remember that these financial calculations are based on key assumptions. If any of your assumptions change, analyze all of the options again before going forward with a proposed package of options. Another important factor that may affect the decision to pursue an energy-performance investment is the manner in which the project is financed. Financing options affect the balance sheet in different ways and can be a determining factor on whether to accept an investment proposal. See the Financing chapter in this manual for more information on loans, leasing, performance contracting, and other financing alternatives.



Table 4: Assemble A Profitable Package

<i>Stage Two Lighting Options</i>	<i>NPV</i>	<i>First IRR</i>	<i>Annual Net Cost</i>	<i>Cash Flow</i>	<i>Omitted Savings</i>	<i>Risk</i>
1a Install Occupancy Sensors	\$7,623	26%	\$42,000	\$12,200	Neutral	Neutral
1b Install Central Timeclock	4,902	38%	9,000	3,550	Neutral	Neutral
2 Install LED Exit Signs	5,606	73%	3,250	2,380	Neutral	Neutral
3 Improve Corridor Lighting	5,106	38%	9,490	3,725	Neutral	Neutral
4 Improve Office Lighting	4,751	23%	57,605	15,100	Neutral	Neutral
5 Upgrade Task Lighting	(929)	16%	9,500	2,000	Neutral	Neutral
6 Install Daylighting Controls	(26,524)	2%	59,080	6,500	Neutral	Neutral
<i>Package Results</i>						
Options 1a-4	\$23,091	27%	\$112,345	\$33,405		
Options 1a-5	\$22,161	26%	\$121,845	\$35,405		
Options 1a-6	\$(4,363)	19%	\$180,925	\$39,905		



## FINANCING

### Overview

Energy performance projects may be different from many other business investments in that they provide an immediate and predictable positive cash flow resulting from lower energy bills. This feature allows them to be financed with both familiar and unconventional financing products.

Regardless of your organizational requirements or constraints, there is a financing option available to help you realize the profitability of energy performance improvements.

Financing section discusses payment and financing options and suggests evaluation criteria to help you select the option that is right for your organization, whether you are in the private or public sector. While the right financing option will depend upon many factors such as debt capacity, in-house expertise, and risk tolerance, there are viable options for virtually any type of organization. The following table summarizes financing options traditionally used in the public and private sectors.

	Public	Private
<b>Purchasing</b>	1	1
Cash	1	1
Loan		1
<b>Leasing</b>		
Capital Lease		1
Tax-Exempt Lease		1
Operating Lease		1
<b>Performance Contracting</b>		
Shared Savings	1	1
Paid from Savings	1	1

### Payment and Financing Options

The payment and financing options discussed below include:

- Purchasing equipment and services
- Leasing
- Performance contracting
- Public and Institutional Options



## *Purchasing Equipment and Services*

### *Cash*

A cash purchase is the simplest method for financing energy performance improvements. A cash purchase makes sense if your organization has cash reserves and a strong balance sheet. The advantage of a cash purchase is that all cost savings realized from the upgrade are immediately available to your organization. Additionally, the depreciation of the equipment becomes a tax deduction. The disadvantage of a cash purchase is the loss of opportunities associated with not having that capital available for other investments.

Generally, relatively inexpensive, simple efficiency measures that are likely to pay for themselves in about a year are purchased with cash. Large complex projects are often financed differently.

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Cash Purchase	
On balance sheet?	yes
Initial payment	100%
Payments	none
Ownership	owner
Tax deductions	depreciation
Performance risk	owner

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### *Loan*

Lenders may require up to a 40 percent down payment on loans for energy projects. Generally, a high-risk loan will have less leverage (ratio of debt to equity for the project), a higher interest rate, and a shorter term of debt. As a borrower, you may put up business or personal assets as security for the loan. Your borrowing ability will depend on your organization's current debt load and credit worthiness. Loan payments may be structured to be equal to or slightly lower than projected energy savings. In this financing arrangement, you bear all the risks of the project and receive all the benefits.

Including high performance features during new building design is simpler to justify, since energy efficiency depends on the selection and combination of components that will be purchased regardless of performance goals. Rightsizing lighting and HVAC equipment may eliminate incremental first cost increases. As a result, many of these projects need no additional funding or a slight increase for extended architectural and engineering services and commissioning.



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Loan	
On balance sheet?	yes
Initial payment	downpayment
Payments	fixed
Ownership	owner
Tax deductions	depreciation, interest
Performance risk	owner

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### *Leasing*

You may procure your energy performance upgrade through leasing to spread out the term of payments. Lease payments are usually lower than loan payments. Laws and regulations for equipment leasing are complex and change frequently, so be sure to consult your financial executive, attorney, or auditor before entering into a lease agreement.

### *Capital Lease*

Capital leases are installment purchases of equipment. Little or no initial capital outlay is required. With a capital lease, you eventually own the equipment and may take deductions for depreciation and for the interest portion of payments. A capital asset and associated liability will be recorded on your organization's balance sheet.

Based on the criteria defined by the Financial Accounting Standards Board (FASB) Statement No. 13, a lease meeting one or more of the following criteria qualifies as a capital lease:

- The lease transfers ownership of property to the customer at end of the lease term.
- The lease contains a bargain purchase option.
- The lease term covers 75 percent or more of the estimated economic life of the equipment.
- The value of the lease equals or exceeds 90 percent of the fair market value of the equipment at the beginning of the lease.

If you work for a governmental organization, you may be eligible for a tax-exempt capital lease. Because the lessor does not pay taxes on the interest from these leases, the rates are lower than typical market rates. For municipal organizations that can undertake new debt, tax-exempt capital leases can be very attractive.

### *Tax-Exempt Lease*

A tax-exempt lease purchase agreement, also known as a municipal lease, is closer to an installment purchase agreement than a rental agreement. You will own the equipment after the financing term is over. A benefit of the lease purchase agreement is that the lessee's (borrower's) payment obligation usually terminates if



the lessee fails to appropriate funds to make lease payments. Because of this provision, neither the lease nor the lease payments are considered debt, and payments can be made from the energy savings in your operating budget. Unlike bond issues, tax-exempt lease purchase financing usually does not require a voter referendum because it is considered an operating rather than capital expenditure due to this non-appropriation language. However, lenders will want to know that the assets being financed are of essential use, which will minimize the risk of non-appropriation. In fact, your organization may already be leasing equipment, and it may be surprisingly easy to add your energy project to the existing lease agreement, especially if your organization has a Master Lease in place with a lending institution.

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Capital Lease

On balance sheet?	yes
Initial payment	none
Payments	fixed
Ownership	owner
Tax deductions	depreciation, interest
Performance risk	owner

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*Operating Lease*

Under an operating lease, the lessor owns the equipment. It is, in effect, “rented” (leased) to your organization for a fixed monthly fee during the contract period. The lessor claims any tax benefits associated with the depreciation of the equipment. At the end of the contract term, you can purchase the equipment at fair market value (or at a predetermined amount), renegotiate the lease, or have the equipment removed.

To meet the FASB definition of an operating lease, the lease term must be less than 75 percent of the equipment’s economic life, and the total value of the lease payments must be less than 90 percent of the fair market value of the equipment at the start of the lease. If the equipment has residual value as used equipment, it may be eligible for an operating lease.

Discuss the project’s qualifications with a financial decision-maker before entering into an operating lease for energy-efficient equipment.

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Operating Lease

On balance sheet?	no
Initial payment:	none
Payments:	fixed
Ownership:	lessor
Tax deductions:	lessor
Performance risk:	lessor

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### ***Performance Contracting***

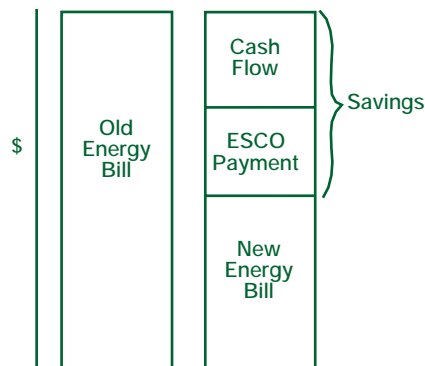
As you research financing options for your project, you will certainly hear about performance contracting. A performance contract may be the preferred financing option if your organization wants to keep the upgrade project off its balance sheet. This type of contracting can be complex, but it is becoming increasingly common.

A performance contract is one in which payment for a project is contingent upon its successful operation (see Figure 1). For an energy performance upgrade, services are rendered in exchange for a share of the future profits from the project.

A performance contract can be undertaken with no up-front cost to the building owner and is paid for out of energy savings. The service provider obtains financing and assumes the performance risks associated with the project. The financing organization owns the upgraded equipment during the term of the contract, and the equipment asset and debt do not appear on your balance sheet. Financing for performance contracts relies little on the financial strength of the building owner, but it is based on the cost savings potential of the project.

Through performance contracting, any of the financing options discussed above can be negotiated to guarantee that, as the customer, you receive the estimated cost savings from the energy performance upgrade. Performance contracting can be applied to purchases or leases.

*Figure 1: Performance Contract*



In a performance contract, an outside party provides a services package. This package can range from a simple audit, installation, and monitoring to full operation of a facility's energy systems. The service provider typically conducts an energy audit, designs the cost-effective projects, obtains bids, manages the construction, guarantees energy savings, obtains financing, and maintains the energy-saving capital improvements. You use resulting energy savings to pay for the improvements.



Performance contracts are sometimes referred to as “shared savings” or “paid from savings” contracts. These terms refer to the manner in which payment is made for the upgrade.

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Performance Contracting

On balance sheet?	no.
Initial payment:	none.
Payments:	variable or fixed.
Ownership:	contractor.
Tax deductions:	contractor.
Performance risk:	contractor.

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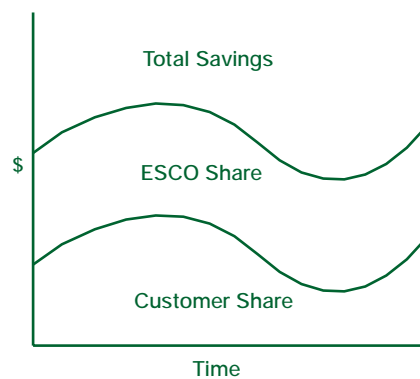
The service provider pays the energy bill and retains the difference between your payment and the actual bill (for example, the actual bill may be only 60 percent of the expected bill). In this case, if there is an increase in energy usage, the service provider must make up the difference between your payment and the actual bill.

*Shared Savings*

With shared savings, the dollar value of the measured savings is divided between you and the service provider (see Figure 2). If there are no cost savings, you pay the energy bill and owe the contractor nothing for that period. The percentage distribution of the savings between the service provider and the customer is agreed upon in advance and documented in the performance contract. At the end of the contract, ownership transfers to the building owner as specified in the contract. You either may purchase the equipment at fair market value or simply assume ownership of the equipment paid for during the contract term.

*Figure 2: Shared Savings*

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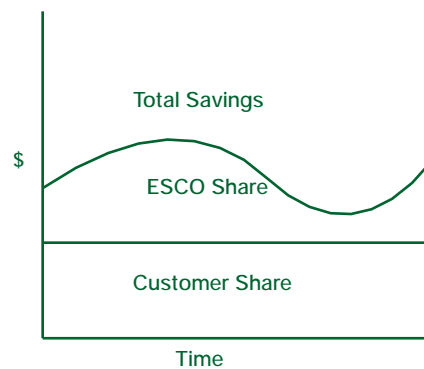


Figures 2 and 3 illustrate the distribution of the cost savings under two scenarios. The specific payment arrangements between you and the service provider are specified in your contract.

### *Paid from Savings*

Almost all energy performance projects are paid for from the savings created by reduced energy usage. Thus, the term “paid from savings” can be used for several different types of energy-upgrade contracts. Here it is being used to refer to another performance contract payment whereby you pay the service provider a predetermined amount each period (for example, an amount equal to 80 percent of the expected energy bill before the upgrade—see Figure 3).

*Figure 3: Paid From Savings*



Performance contracts can be complex and take a long time to negotiate and implement. The contracts usually:

- Specify detailed work for individual facilities
- Involve large sums of capital
- Cover a wide range of contingencies
- Require significant expertise in law, engineering and finance

For a service provider and financier to make a commitment to an energy efficiency project, the potential for savings must be substantial. Performance contracts are usually arranged for facilities with annual energy costs over \$150,000. However, smaller projects may be good candidates depending on the project specifics.

Entering into a performance contract is like forming a partnership with a service provider. You are arranging a complex, long-term relationship through a contractual agreement. It is important for you to remain in close communication with the service



provider during contract negotiations and project implementation. Build contingencies into the contract for any issues you can anticipate. For example, an operations change such as adding a piece of manufacturing equipment or changing operating hours can have a significant impact on energy use. By incorporating responses to likely changes up front, you can avert major operational or contractual problems down the road.

A performance contract is a major commitment for you and the service provider. As a financing tool, it offers the benefits of low-risk capital improvements off the balance sheet. Although there are no initial payments to the contractor, you should expect to spend time and resources providing data the service provider will need to perform the audit and establish a baseline from which to estimate energy savings. If you wish to select a service provider through a competitive procurement, you will have to prepare requests for qualifications or proposals and evaluate the submittals.

Defining all the terms and conditions of the contract can be a lengthy process and may require hiring independent engineers or other professionals to review the contract on your behalf. The business of performance contracting is growing, so there is an expanding pool of competent and capable service providers available to you. Although the contracting process is complex, it creates an opportunity for organizations with limited debt capacity or capital resources to undertake profitable energy performance projects that would otherwise not be implemented.

#### *Guaranteed Savings Insurance*

Guaranteed savings insurance is a method of reducing your risk. This option guarantees that energy cost savings will exceed an established minimum dollar value. Typically, this guaranteed minimum equals the financing payment for the same period to ensure a positive cash flow during the financing term.

Like any insurance policy, you'll pay a premium that compensates the guarantor for the performance risk and covers monitoring costs. This premium is added to your loan or lease payment and the guarantor will maintain and monitor the performance of your upgrade. The supplier, installer, or service provider selling the upgrade usually offers this guarantee.

#### *Public and Institutional Financing Options*

The two most common public sector mechanisms are tax-exempt lease purchase agreements and performance contracts. A performance contract can be considered a finance mechanism because it bundles together with performance guarantees one or more of the following components: financing, equipment, energy costs, and maintenance. Both mechanisms are effective alternatives to traditional debt financing, and both may allow you to pay for energy efficiency upgrades by using money that is already in your utility operating budget. By spending only operating



budget dollars, you may avoid the cumbersome capital budget process altogether. Both mechanisms will allow you to draw on dollars saved from future energy bills to pay for new, energy-efficient equipment today.

## Evaluation Factors

Finding the right financing vehicle for your project requires a thorough evaluation of your options. The following factors will help define your organization's business profile and will enable you to select the financing option that best meets your organization's objectives.

- Balance sheet
- Initial payment
- Payments
- Ownership
- Tax deductions
- Performance risk

A brief description of each follows.

### *Balance Sheet*

If your organization is near the level of debt permitted by your lenders, you may not be able to undertake additional debt without violating certain covenants. There are, however, methods that enable a company that cannot assume more debt to proceed with an upgrade and take advantage of the financial benefits.

### *Initial Payment*

A large initial capital outlay may be an obstacle for some organizations planning energy performance upgrades. If you have large capital reserves or are planning a small project, it makes sense to pay for the project with cash. Then all the cost savings from the project will be immediately available to you to offset the original investment. There are financing options that can move a project forward with no initial capital outlay from you, the customer. If capital resources are tight, you may want to consider a performance contract.

### *Payments*

Your goal is to obtain financing at a minimum cost to your organization. However, benefits such as off-balance sheet financing may justify paying more for your borrowed money. The general advantage of energy performance investments is that even with performance contracts, which tend to be more costly because of the amount of monitoring and verification involved, you are guaranteed to receive



**Table 1: Financing Options**

	<i>Cash</i>	<i>Bonds</i>	<i>Municipal Lease</i>	<i>Performance Contracts</i>
Interest Rates	N/A	Lowest	Low tax-exempt rate	Can be taxable or tax-exempt tax-exempt rate
Financing Term	N/A	May be 20 years of more	Up to 10 years is common and up to 12-15 years is possible for large projects	Typically up to 10 years but may be as long as 15 years
Other Costs	N/A	Underwriting legal opinion, insurance, etc.	None	May have to pay engineering costs if contract not executed
Approval Process	Internal	May have to be approved by tax payers or public referendum	Internal approvals needed. Simple attorney letter required	RFP usually required, internal approvals needed
Approval Time	Current budget period	May be lengthy - process may take years	Generally within one day	Generally within 2-3 days once the award is made
Funding Flexibility	N/A	Very difficult to go above the dollar ceiling	Can set up a Master Lease, which allows you to draw down funds as needed	Relatively flexible. An underlying Municipal Lease is often used
Budget Used	Either	Capital	Operating	Operating
Largest Benefit	Direct access if	Low interest rate because it is a general obligation of the public entity	Allows you to buy capital equipment using operating dollars	Provides performance guarantees which help approval process
Largest Hurdle	Never seems to be enough money available for projects	Very time consuming	Identifying the project to be financed	Identifying the project to be financed and selecting the ESCO



financial benefits immediately upon completion of the project. At the end of the contract term, those savings are yours.

#### *Ownership*

If you own your energy performance upgrade equipment, you are entitled to tax deductions for depreciation or interest payments and other benefits. You are also liable for any performance risk associated with the equipment.

#### *Tax Deductions*

As an equipment owner, your business is entitled to potential tax benefits such as depreciation and deductions for loan interest. If you finance your upgrade off the balance sheet, you will not be eligible for tax benefits.

#### *Performance Risk*

There is risk associated with any investment. Energy performance upgrades can be low-risk investments because they apply proven technologies with long records of performance. However, the financing option you choose will affect who bears the risk of performance failure.

Performance risk of energy upgrades depends on the accuracy of the assumptions concerning maintenance, cost of energy, occupancy, and other factors. Lighting upgrades are typically considered a lower risk investment than HVAC investments, because it is easier to predict energy savings from lighting upgrades.

## **More Savings Opportunities**

When you begin your search for project capital, begin by bargain hunting for special programs that support energy performance. Every organization planning an energy performance upgrade should investigate the availability of utility incentives, state assistance, and other cost-reducing measures.

#### *Utility Incentives*

Utilities often provide financial incentives for energy performance upgrades through rebates, fuel switching incentives, low-interest loans, and energy audits. Check with your local utility to learn what programs are available.

#### *State Assistance*

Some states offer financial assistance to nonprofit organization or small businesses for operating improvement upgrades. Contact the state agency that monitors the type of service provided by your organization to inquire about these opportunities. For





example, Florida’s Energy Loan Program was created to motivate small business owners to evaluate their total energy usage and implement energy conservation measures. Funding may be available through the State Energy Programs, energy conservation programs supported by the US Department of Energy.

## Summary of Options

Whether your energy performance project involves small improvements or a complete system upgrade, there is a suitable financing option for you. A simple cash purchase yields immediate benefits to the customer and is a straightforward transaction. It is well suited for small or low-risk upgrades. Performance contracting, the most complex type of arrangement, offers the customer the benefit of risk protection. It is also the most costly financing option because of the amount of monitoring and verification required. However, even this more expensive alternative yields a positive cash flow for the customer immediately upon installation. Regardless of your organizational requirements or constraints, there is a financing option available to help you realize the profitability of energy performance improvements.

Table 2: Summary Of Options

<i>Evaluation Factor</i>	<i>Cash Purchase</i>	<i>Loan</i>	<i>Capital Lease</i>	<i>Operating Lease</i>	<i>Performance Contract</i>
Balance sheet	on	on	on	off	off
Initial payment	100%	downpayment	none	none	none
Payments	none	fixed	fixed	fixed	variable or fixed
Ownership	owner	owner	owner	lessor	contractor
Tax deductions	depreciation	depreciation, interest	depreciation, interest	lessor	contractor
Performance risk	owner	owner	owner	lessor	contractor