U.S. Department of Energy

FINANCING

Energy Efficiency in Buildings

• Rebuild America Guide Series •

Introduction

This Guide is written to aid Rebuild America partnerships that are considering investments in energy-efficiency projects. It provides definitions, descriptions, and advice on choosing effective energy-efficiency financing strategies. It should be used in coordination with *Rebuild America's Community Partnership Handbook*, which outlines eight important steps for planning and carrying out a community-wide energy-efficiency program. As shown on page 3 of this Guide, financing is an integral part of partnership activities. Financing opportunities must be weighed carefully during both project planning and implementation. Most importantly, a number of discrete actions should be taken in order to successfully finance an energy-efficiency project.

Rebuild America strongly encourages its partners to incorporate the information found in this Guide into their energy-efficiency financing strategies. Innovation is the key to success in financing. Often combining energy-efficiency measures with short- and long-term returns improves the financial outlook for a project. Although there is no one perfect way to obtain financing for energy efficiency in buildings and facilities, the financing strategies described in this Guide provide a basis to assist Rebuild America partnerships in making creative financing decisions.

The Outlook for Energy-Efficiency Investments

Businesses often have to make difficult decisions to balance environmental considerations with cost-effectiveness. Decisions involving energy-efficiency improvements are an exception because they are both environmentally sound and profitable. The rate of return on energy-efficiency investments is often higher than returns available in the stock market. However, capturing the real financial rewards of energy efficiency is more complex than simply choosing a new light bulb. Even if the short-term savings and long-term economic benefits of energy-efficiency improvements are obvious, up-front capital for energy-efficiency projects is often hard to find.

The investment picture for energy-efficiency improvements is changing rapidly. During the 1980s, Federal and state subsidies were available for investments in energy efficiency; utilities funded demand side management (DSM) programs that encouraged home and business owners to invest capital in energy efficiency; and energy service companies (ESCos) became pioneers in offering financial packaging coupled with energy-improvement services. Under these conditions, the market for energy-efficiency equipment and financing expanded rapidly.

At the end of the 1990s, government subsidies and demand-side management programs are much smaller. However, the experience that the industry has gained in packaging energy-efficiency financing with technical know-how has value in the emerging competitive utility industry. In this marketplace, energy service companies are continuing to grow, both as independent firms and as unregulated utility subsidiaries.

The emergence of investment banking institutions seeking profitable opportunities through financing energy-efficiency projects bolsters this trend. In addition to banks and leasing companies, insurance companies, labor pension funds, and philanthropic foundations now have a growing interest in financing energy efficiency. Many of these institutions, especially the insurance industry, are likely to play a vital role in the growth of financing future building retrofits.

Why Are Energy-Efficiency Investments Important?

Energy-efficiency improvements are vital to the nation's economic competitiveness, and can potentially help limit global climate change. In recognition of these facts, Federal policy strongly supports the increase in investments in energy efficiency. Among other Federal initiatives, the U.S. Environmental Protection Agency's (EPA's) Green Lights and Energy Star Programs, the U.S. Department of Energy's (DOE's) Federal Energy Management Program (FEMP), and the community-wide approach led by Rebuild America foster profitable investments in energy- efficiency by business and government.

Steps for Your Partnership

1 Form Your Partnership

Make a commitment to significantly reduce building energy use and cost in your community, and identify the organizations who will work together with you.

2 Collect and Examine Data

Define your targeted building stock and collect basic data on building characteristics, energy use, and energy costs.

3 Conduct Initial Screening

Conduct a simple screening of your targeted buildings to identify a candidate list of buildings that represent the best opportunities for energy savings.

4 Define Financing Options

Take a first look at costs, savings, and financing issues; develop rough cost estimates and funding options for both management and capital costs.

Successful Energy-Efficiency Financing

- Learn about various financing options
- Determine project size, requirements, and necessary financing measures
- Communicate project financing goals and objectives to potential financiers

5 Develop an Action Plan

Define a practical action plan with your partners, using everything above to outline clear program goals along with management, financing, marketing, and business strategies to achieve them.

6 Evaluate Individual Buildings

Perform detailed energy audits on your best candidate buildings to define specific efficiency measures, their costs, and their savings potential.

7 Implement Your Program

Design, finance, install, and commission energy-efficiency retrofits. Consider holding community-wide education and training programs, and look into changes to codes and standards that can help your efforts.

8 Verify and Report Results

Verify and document the savings you have achieved in order to enhance the credibility of your program, improve it, and tell others about your results.

What DOE Will Do to Help

DOE formally recognizes the commitment of members of Rebuild America by assigning a Program Representative as a primary point of contact for assistance. Program Representatives are available to assist in developing and pursuing energy-efficiency financing strategies.

A broad range of guidance materials, technical information, analytical tools, topic-specific workshops, and expert and peer contacts are available through Program Representatives and DOE's support network of national laboratories. Also, to ensure that all participants benefit from the experience of individual partnerships, Chapters 2, 3, and 4 of this Guide present case studies of successful financing projects. Further information about Rebuild America products and services can be found on Rebuild America's web-site at www.eren.doe.gov/buildings/rebuild/.

How to Use This Guide

The balance of this Guide consists of four main chapters followed by an internet resource list, glossary, and bibliography. Discussions of financing and contracting opportunities include summaries of their advantages and disadvantages, as well as examples of their use. The Guide explains in clear, non-technical terms the basic principles that are important in making retrofit financing decisions. Three main financing methods available for capital investment in energy-efficiency building improvement are discussed. Advantages and disadvantages of each are provided.

Chapter 1: General Investment Principles

Chapter 1 outlines fundamental concepts and principles important in defining the scope of a project and in evaluating its true profitability. Concepts include defining important objectives, methods of determining success, selecting approaches to meet economic and financial constraints, and methods of verifying results.

Chapter 2: Financing Options

The second chapter discusses three primary financing methods including: (1) internal operating and capital funds, (2) debt financing, and (3) lease and lease-purchase arrangements. The chapter also presents advantages and disadvantages of each method, and provides case studies and examples.

Chapter 3: Energy Saving Performance Contracts (ESPCs)

Chapter 3 describes key elements of energy saving performance contracting, including typical service options and features. The chapter describes conditions of an energy performance contract; when to hire an energy performance contractor, and how to verify contractor performance and savings.
This chapter also recommends a process to solicit and select an energy service company.

Chapter 4: State and Utility Programs

Chapter 4 discusses state programs and utility incentives, and how incentive programs can help project managers develop a viable financing strategy in today's increasingly competitive energy marketplace.

Chapter 1: General Investment Principles

Overview

Several general investment principles are essential to the financing of energy-efficiency projects. These principles apply to investments in such energy-efficiency improvements as building retrofits, streetlighting upgrades, cogeneration plants, renewable energy technologies, and district heating and cooling systems. Project managers should use these principles as an aid in determining both the goals and objectives of an energy-efficiency project and the best financing strategy.

Project managers will derive maximum returns from their project investments by strategically utilizing the investment principles described below. These investment principles, which focus on planning, analysis, and financing strategies for an energy-efficiency investment, include the following:

- Determine project objectives
- Avoid cream skimming
- Identify all cash flows
- Focus on life-cycle costs
- Select an effective cost-benefit method
- Base decisions on long-term profitability
- Monitor and verify results

Attention to the full benefits derived from a project will avoid a shortsighted focus on first costs, quick savings, and simple paybacks — a focus that commonly leads to poor financial decision-making. The way in which an energy-efficiency project is structured is of paramount importance if it is to return comprehensive financial benefits. Such benefits include broad-based improvements in business focus, comfort or functionality, infrastructure, and environmental quality. Such broad-based benefits are the outcome of prudent financial planning — planning that respects the time value of money and helps projects quickly generate positive cash flows.

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Determine Project Objectives

Before considering an investment, decide on its objectives. Reduced energy use and cost savings are two obvious benefits that accrue from investments in energy efficiency. However, projects with comprehensive objectives increase the range of financing possibilities and allow for greater short- and long-term benefits and a broader focus when considering future needs and goals.

Although costs, savings, and financing issues are pivotal factors in determining what energy-efficiency measures to pursue, it is also important to know an investing organization's needs when making an investment. The more carefully needs are translated into project objectives, the more likely a project manager is to structure an investment project well.

Broad Benefits from Energy Efficiency

Energy, by itself, is a commodity with little intrinsic value. Its real worth is that it can be converted to services that improve comfort and productivity, allow the transport of people and goods, and support a broad range of communications resources, time-saving appliances, and data management systems needed by today's businesses, industries, and homes. Energy-efficiency investments should be designed, primarily, to reduce energy expenditures. They should, however, also provide benefits well beyond energy-cost savings. Examples of broader objectives that energy-efficiency improvements can help meet include the following:

- **Enhanced Core Business Focus** – Energy-efficiency improvements can include ongoing services for operations, maintenance, and even the payment of utility bills. Such services can free personnel to focus on core activities of their business or government organization, rather than wasting resources on utility bills, maintenance of energy equipment, or systems.
- **Improved Comfort and/or Functionality** – Sound energy-efficiency improvements often upgrade operational practices and enhance the comfort and functionality of the building environment. When performance and reliability standards for HVAC and lighting are met, operating costs begin to drop.

- **Modernized Infrastructure** – Energy-cost savings can subsidize the costs of modernizing a building's energy infrastructure and controls. When cost-savings are allocated properly, they support capital investments and substantially decrease the total costs of modernizing a facility.
- **Assured Environmental Compliance** – Environmental quality is important to a facility's occupants. For example, indoor air quality has an effect on the productivity of occupants as well as on the value of a building. Environmental compliance can include measures to convert cooling systems to CFC-free equipment or properly dispose of luminaires and other potentially toxic materials.

Capital to attain the above objectives and support strategies to assist both public and private sector facility managers and owners has increased in the last two decades. In the past, when capital and technical support were not readily available, broad-based benefits such as those described above were rarely realized. However, as more project managers utilize innovative financing opportunities (described throughout this Guide) these benefits are being realized more often. The monetary value of benefits derived from a comprehensive project almost always exceeds those accruing to less comprehensive projects. This is because the value of broad-based benefits outweighs the value from energy savings alone. In order to quantify the monetary benefits of improved productivity, infrastructure, and environmental quality, project managers should, whenever possible, include them in cost-benefit analyses.

The monetary value of a comprehensive project almost always exceeds that of less comprehensive projects.

Criteria for an Investment Decision

Before a project's goals and objectives can be solidified, the organization investing in an energy-efficiency improvement must clearly define what it considers profitable investment criteria. The more effectively investment criteria are translated into a project's goals and objectives, the more likely project designers and managers are to make fiscally sound investment decisions.

Knowledge of a sponsoring organization's investment criteria provides a road map that helps program managers avoid pitfalls and gain approval from financiers and other decision-makers. Key investment criteria should be defined at the beginning of any effort to finance energy-efficiency improvements and may include the following:

- **Reduced Capital and Operating Costs** – Energy-cost reductions, avoidance of energy-cost increases, or decreased capital costs for infrastructure modernization may all be criteria for an energy-efficiency project. For example, project criteria may state, *"Targets include a 25% reduction in utility bills, as well as reduced capital investment for the chiller replacement."*
- **Exceeding the Organization's "Hurdle Rate"** – Investment targets may be stated in terms of the minimum internal rate of return. For example, project criteria may state, *"The target is a 20% annualized internal rate of return for all comprehensive energy-efficiency investments."*
- **Maintenance of Positive Cash Flow** – Investments may be treated as a total package that must achieve neutral or positive cash flow. Cash flow can be compared to pre-retrofit costs within any given time-frame. For example, project criteria may state, *"Positive cash flow, including financing costs, utility bills, and maintenance services, must be achieved within two years of completing energy-efficiency improvements."*
- **Financing Either On or Off the Balance Sheet** – Investments may be financed on or off an organization's balance sheet. This decision will be based on internal capital availability, debt limits, and other factors. For example, project criteria may state, *"All project costs over $__________ will be financed off the balance sheet through lease, lease-purchase, or energy service performance contracting arrangements."*

Avoid Cream Skimming

Cream-skimming projects have impressive initial returns on investment, yet they commonly yield lower absolute energy and cost savings when compared to more comprehensive projects.

"Cream skimming" is often an undesirable yet all too common practice of investing in simple projects with relatively low initial costs and quick paybacks. While such investments are financially attractive in the short term, pursuing them may prevent a building owner from capturing significant long-term benefits that are likely to result from more extensive and capital-intensive retrofits. Cream-skimming projects have impressive initial returns on investment, yet they commonly yield lower absolute energy and cost savings when compared to more comprehensive projects. Moreover, due to their emphasis on short-term paybacks, cream skimming weakens an organization's ability to finance more capital-intensive improvements that leverage the value of those short-term paybacks.

An Example of Lost Savings

A simple lighting retrofit is a good example of cream skimming. Because lighting system improvements usually have low capital costs and high savings-to-cost ratios, they usually have relatively short payback periods. Energy-savings ratios for such improvements can be very impressive. A good upgrade can reduce lighting energy use by 30 to 40%, and have a simple payback of 1 to 2 years. But lighting only accounts for a third or less of the energy use in a typical office building. Achieving optimal energy savings in the other two-thirds may require energy-efficiency upgrades in the HVAC system, building envelope, and office equipment.

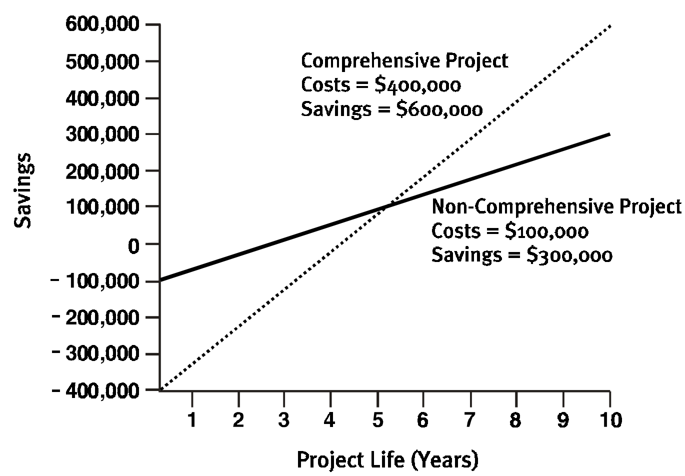
Usually, a comprehensive building retrofit project has higher up-front costs, longer payback periods, and larger energy savings. However, if planners and financiers refuse such projects due to a longer payback period or larger capital costs, a building's full energy-savings potential will remain untapped.

By utilizing "bundling," project managers can more fully realize energy and cost-savings objectives, while also meeting reasonable payback criteria. "Bundling" refers to the practice of including both short- and long-term energy-efficiency measures in the same project planning and financing scheme. When a comprehensive energy-efficiency project is planned, paybacks from short-term measures, like lighting system retrofits, can be used to offset costs for more system-wide measures that have longer payback periods. By bundling all energy-efficiency measures for a single project into one financially viable package, projects will realize a more attractive total return.

A Comparison of Options

Two types of energy-efficiency project options are discussed throughout the remainder of this Chapter. These include a "non-comprehensive" (lighting-only) retrofit project and a "comprehensive" retrofit project that contains a mix of both large and small energy-efficiency measures. The non-comprehensive project has an initial capital cost of $100,000 which is paid off after two-and-a-half years. The comprehensive project has an initial capital cost of $400,000, which is paid off after four years. Figure 1 illustrates the amount of energy-cost savings attained by each project over its useful life (10 years in each case).

Figure 1 – Two Project Options



In this example, the comprehensive project costs four times that of the non-comprehensive project and has a longer payback period. However, its savings make it well worth the higher initial investment. Cumulative savings from the more comprehensive retrofit are significantly higher than those of the non-comprehensive project during the second half of these projects' lives and will provide twice the energy-cost savings of the lighting retrofit.

Identify All Cash Flows

Cash flow scenarios that identify all project costs and savings over the life of a project are a crucial element of any financial analysis. Determining the life of an energy project requires taking into account the term for any requisite project financing and determining how long resultant benefits will accrue to the end user, as well as the life span of all other costs and savings associated with a new energy product or system. At a minimum, the following expenses must be accurately measured when choosing between projects:

- Planning and management
- Capital acquisition and financing
- Installation and commissioning
- Operations and maintenance

Cash-flow estimates of costs and savings are required for any type of investment analysis, whether that analysis is limited merely to a simple payback estimate, or a more sophisticated assessment of the investment's value over the long term.

Major Cost Elements

Major cost elements typically associated with comprehensive retrofits are presented in Table 1. Accurate cost projections must include the full range of costs accruing to the project throughout its useful life.

Substantial expertise and sound professional judgment are necessary when estimating several of the elements presented in Table 1, including inflation and utility factors, tax implications, and future fuel and power costs. Expertise should also be sought in deciding upon the discount rate to be applied to any cost-benefit analysis of the cash flow.

Table 1 — Cash Flow Components of a Typical Project [1]

1) Planning and Management
- Project management costs
- Consulting fees
- Design and engineering
- Monitoring and verifying results

2) Capital Acquisition and Financing
- Material and procurement costs
- Financing costs
- Inflation and utility factors
- Tax effects

3) Installation and Commissioning
- Installation labor
- Building tune-ups
- Revised load projections
- Commissioning

4) Operations and Maintenance
- Fuel and power costs
- Maintenance costs and supplies
- Waste disposal costs
- Staff training

[1] Cost estimates for larger projects must include the costs of disposing of or salvaging equipment at the end of its useful life.

The Search for Positive Cash Flows

Up-front project investments will almost always create a short-term negative cash flow. Subsequent reductions in energy use and operation and maintenance costs eventually produce cost savings that result in a positive cash flow. A primary goal of any energy-efficiency investment should be to create positive cash flow as quickly as possible. Project planners should examine all cash flows associated with a project to develop a scenario that quickly turns cash flows positive and will eventually exceed the costs of the principal payback and debt service requirements.

A primary goal of any energy efficiency investment should be to create positive cash flow as quickly as possible.

Negative cash flows commonly occur at the commencement of a project when lump-sum capital investments are made. However, financing arrangements that pay back capital costs over time, or which use leasing or third-party arrangements through energy service companies (ESCos) can often be structured to minimize or even eliminate this initial period of negative cash flow.

Focus on Life-Cycle Costs

Life-cycle costs (LCC) should be used when measuring alternate approaches for energy-efficiency improvements (including "no-action" alternatives). LCCs include all costs of acquiring, installing, owning, operating, and disposing of a building, facility, or piece of equipment. Life-cycle costing integrates all positive and negative cash flows accruing to a project over its useful life.

LCC can be applied to energy-efficiency projects in vehicles, office equipment, or even whole buildings and should be used any time there are both fixed and variable costs associated with a capital improvement. An example of fixed capital costs is equipment acquisition; variable costs include monthly fuel bills and ongoing operations and maintenance costs.

The Importance of Life-Cycle Costing

Project managers who use LCC analysis are more likely to obtain profitable projects than those who do not use it.

Utilizing LCC analysis is especially important when costing out major energy-efficiency upgrades in buildings or other long-term improvements. A sound LCC analysis often shows that the most affordable set of retrofit measures and equipment is not necessarily the one with the lowest initial cost. The LCC approach is essential in helping project planners reach sound financial decisions, because it accurately compares the value of competing alternatives. Project managers who use LCC analysis are more likely to obtain profitable projects than those who do not use it.

Elements in the LCC Process

Accurate LCC analysis depends on obtaining correct estimates of all costs associated with the acquisition and use of new energy-efficient equipment and systems. A wide variety of software programs for life-cycle costing is available both in the public domain and as proprietary software. These programs can help present LCC analysis in a variety of formats in order for decision makers to easily understand the significance of the results. References for several of these programs are included in the bibliography at the end of this Guide.

Select an Effective Cost-Benefit Method

The major function of investment analysis is to determine which projects have greater benefits than costs (i.e., those investments that will be most profitable to an organization). The cost-benefit method for evaluating project alternatives can range from simple to sophisticated. Three primary cost-benefit methods are discussed in this section. They can be used separately or together in evaluating investments in energy efficiency. These methods include the following:

- Simple payback analysis
- Internal rate of return (IRR)
- Net present value (NPV)

The basic elements of each method, along with the major advantages and disadvantages of each are described below. To simplify these explanations, examples used for illustrative purposes assume that all initial costs are paid as up-front lump-sum expenses.

Simple Payback Analysis

Simple payback analysis should be used with caution by decision-makers. Using this method, a project's total cost is divided by the energy-cost savings accruing to it in the first year after it has begun. The example in the chart at right illustrates the non-comprehensive project presented earlier. A simple payback calculation provides a rough initial estimate of the time needed to recover the initial investment. Simple payback analyses should rarely, if ever, be used as the final basis upon which to select an investment option. This cost-benefit method can be a valuable tool in marketing energy projects, since it can be easily understood by individuals with minimal financial expertise. However, investors are unlikely to be interested in projects that are presented with simple payback scenarios because of the following drawbacks:

Lighting Retrofit Simple Payback

A commercial lighting system retrofit includes the addition of T-8 lamps, electronic ballasts, new reflectors, and occupancy sensors. The cost of designing, acquiring, and installing the new equipment is \$100,000. With projected energy savings of about \$40,000 per year (800,000 kWh at \$0.05/kWh), *the simple payback period* for this energy retrofit is:

$$\frac{\$100{,}000}{\$40{,}000/\text{years}} = 2.5 \text{ years}$$

The commercial lighting system retrofit will pay for itself in 2.5 years using this cost-benefit method.

A simple payback calculation provides a rough initial estimate of the time needed to recover the initial investment. Simple payback analyses should rarely, if ever, be used as the final basis upon which to select an investment option.

- Simple payback analysis does not reflect savings that will continue to accrue to the project after the payback point has been reached. If the payback periods for two different projects are 2.5 years and 4 years, respectively, a decision based on simple payback ignores cumulative lifetime savings. Disregarding the benefits that accrue over the useful life of a project encourages smaller total savings through cream skimming.
- Simple payback analysis does not take into account the time value of money. This is a crucial drawback, especially in cases where the dollar value of a project is large and/or the useful life of the improvements is long. In order to properly compare the economic benefits of competing long-range upgrade projects, one must discount the value of future dollars relative to today's dollars.

Two other cost-benefit methods, discussed below, offer more significant advantages for determining project energy-efficiency.

Internal Rate of Return (IRR)

Internal rate of return (IRR) is a cost-benefit method that evaluates the profitability of capital expenditures over their useful lives. It essentially gives an annualized rate of return for an investment based on life-cycle payments (negative cash flows) and income (positive cash flows from energy savings). IRR thus addresses the main drawback of simple payback analysis by accounting for cumulative cash flows *over the expected life of the improvements.*

IRR is the rate of return at which the sum of discounted future cash flows equals the initial investment outlay. IRR is often referred to as the "hurdle rate" or the "go" or "no go" criterion required for the approval of an investment. Most government and private sector organizations set internal hurdle rates that must be met. These hurdle rates are usually a function of the organization's cost of capital and the annual returns expected from alternate investments. Municipal hurdle rates in today's economy are in the range of 10-15%. Private rates are generally higher and may range up to 20% or more. The hurdle rate at which energy upgrades are considered profitable through EPA's *Green Lights Program* is 20%.

The IRRs of the non-comprehensive and comprehensive retrofit projects discussed earlier are 38% and 21%, respectively. With regard to these rates, both projects would be attractive to typical municipal borrowers and the EPA's *Green Lights Program,* since their IRRs exceed the likely or expected hurdle rate for such programs. However, as discussed in the section that follows, the non-comprehensive project is not the most profitable of the two projects.

IRR gauges the useful life of an improvement and incorporates the time value of money. IRR provides a useful measure of the financial value of an improvement, and is a much better way to evaluate competing investments than is simple payback analysis. Like simple payback, however, it also provides an easy-to-understand measure that is useful in marketing a project to organizational decision-makers and financiers alike. But IRR analysis still does not fully account for the relative profitability of competing projects — a factor that can significantly influence the best choice among alternative proposals.

IRR gauges the useful life of an improvement and incorporates the time value of money. IRR provides a useful measure of the financial value of an improvement, and is a much better way to evaluate competing investments than is simple payback analysis.

Net Present Value (NPV)

Net present value (NPV) is the key profitability indicator that takes into account both life-cycle cash flows and the time value of money. NPV should be used as the primary method for evaluating project-financing decisions. The higher the NPV, the greater the profitability of an investment.

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NPV incorporates life-cycle cost and savings estimates, as well as investment hurdle rates and the time value of money. NPV is calculated by adding the initial investment (always a negative cash flow) to the present value of anticipated future cash flows over the useful life of an improvement. To discount the value of future dollars to today's dollars, NPV calculations commonly use a discount rate equivalent to the "hurdle" rate of the organization considering an investment. With this criterion built into the analysis, if the NPV is positive, the investment is profitable and should be pursued. If the NPV is zero, then the economic value of the investment is neutral. If the NPV of a project is negative, then the investment is not profitable and is not feasible financially.

Table 2 compares the profitability of the non-comprehensive and comprehensive projects using NPV calculations. The initial investment and annual cash flows are discounted at a rate of 12% to derive the present value for each year. The annual cash flow values have been summed to give the NPV.

The table below illustrates the effect of discounting on consecutive yearly cash flows. In this example, the *discount rate* reflects the hurdle rate (or *desired* IRR) for the investing organization. The key to performing this type of discounted cash flow analysis is to use a simple discounting formula, which is $1/(1+r)^n$ (where r = discount rate and n= number of years). Use of this formula yields a *discount factor*. By multiplying the projected yearly cash flow by the discount factor, the present value for that year is determined. Discounting accounts for the time value of money by adjusting the worth of future dollars to the value of today's dollars. The sum of the discounted annual cash flows (including the original investment or outflow) yields the NPV for the investment, and clearly shows the higher profitability of the more comprehensive project.

Table 2 — Calculating NPV

	Lighting System Only			Comprehensive Retrofit		
Year	**Cash Flow**	**Discount Factor (@ 12% rate)**	**Present Value of Cash Flows**	**Cash Flow**	**Discount Factor (@ 12% rate)**	**Present Value of Cash Flows**
0	-$100,000	1.000	-$100,000	-$400,000	1.000	-$400,000
1	40,000	.893	35,720	100,000	.893	89,300
2	40,000	.797	31,880	100,000	.797	79,700
3	40,000	.712	28,480	100,000	.712	71,200
4	40,000	.636	25,440	100,000	.636	63,600
5	40,000	.567	22,680	100,000	.567	56,700
6	40,000	.507	20,280	100,000	.507	50,700
7	40,000	.452	18,080	100,000	.452	45,200
8	40,000	.404	16,160	100,000	.404	40,400
9	40,000	.361	14,440	100,000	.361	36,100
10	40,000	.322	12,880	100,000	.322	32,200
Total	$300,000		$126,040	$600,000		$165,100

Discount Factor = $1/(1+r)^n$

Base Decisions on Long-Term Profitability

Decision-makers are well-advised to measure the long-term profitability of the energy-efficiency investments they make. As mentioned earlier, two crucial variables affecting the long-term profitability of an efficiency investment are the time value of money and a project's life-cycle costs. Of the three cost-benefit methods discussed in the previous section, only NPV addresses both of these variables in a way that lets the investor see the relative profitability of competing capital investments (which may vary in size or comprehensiveness). The use of NPV analysis is especially necessary when proposed improvements have high initial costs and relatively long, useful lives. NPV avoids shortsighted investments that constrain savings.

NPV as a Measure of Profitability

Understanding the three methods for investment analysis described above — simple payback, internal rate of return (IRR) and net present value (NPV) — is of great importance in evaluating various energy projects. Table 3 compares results from each method for the "comprehensive" and "non-comprehensive" energy-efficiency investment projects.

This comparison illustrates why an investor must carefully choose his or her analytic method when examining investment options. According to Table 3, if the decision-maker uses either simple payback criteria or IRR analysis as the basis for choosing one of the two investments, the decision would not yield the most profitable outcome. Although simple payback and IRR analysis make the non-comprehensive project seem more attractive, the comprehensive project has a much higher NPV. Because the comprehensive project has a higher NPV, it is actually the more profitable investment.

Table 3 — NPV and Profitability

Analysis Factors	Non-Comprehensive Project	Comprehensive Project
Investment	$100,000	$400,000
Savings	$40,000/yr.	$100,000/yr.
Simple Payback	2.5 years	4 years
IRR (10 yrs.)	38%	21%
NPV (10 yrs. @ 12%)	$126,040	$165,100

Monitor and Verify Results

The performance of installed measures and the savings that accrue through increased efficiency must be quantified through sound measurement and verification methods specifically defined for the project. When projects are financed and installed by a third party, and especially when performance guarantees are a part of an energy services agreement, specific protocols must be agreed upon by the contractor and the facility owner. These protocols must set a baseline before any improvements are made, establish post-improvement targets, and address any contingencies — such as changes in utility rates or variations in building use and occupancy — that may influence performance during the life of the project. Monitoring may be carried out by the building owner or by an independent contractor.

Basic Principles of Measurement and Verification

Energy use and costs resulting from an energy-efficient project are estimated before improvements are made and measured after installation occurs.

Energy use and costs resulting from an energy-efficient project are estimated before improvements are made and measured after installation occurs. The "before" case is the *baseline*. The "after" case is *post-installation*. Total savings are calculated as the difference between baseline and post-installation energy use and costs. Post-installation measurements should be continued over time to ensure that savings and benefits persist and that appropriate adjustments are made to accommodate variations in weather or changes in building use, occupancy, or operating schedule.

Measurement and Verification Protocols

Strong efforts to establish standard methods for performance verification have been made by the states of New Jersey and California in cooperation with the energy services industry. The U.S. Department of Energy (DOE) has been spearheading a collaborative effort with the energy services industry, financial institutions, and others over the past two years to reach a consensus.

This effort has resulted in the International Performance Measurement and Verification Protocol (IPMVP). IPMVP provides specific guidance to building owners, state, and local governments, ESCos, and financiers on how to quantify performance and energy savings from investments in energy conservation measures. It provides guidance for negotiating contract terms that will ensure a project achieves or exceeds its goals of saving money and improving the environment. Familiarity with, and use of, the IPMVP is highly recommended as a key part of any building improvement project.

General information about the IPMVP, the full protocol, and updates can be downloaded from the internet at **www.bmvp.org/**. This site offers practical guidance on measurement and verification of energy and water efficiency projects, and maintains complete and current information on measuring the benefits from energy conservation measures.

Chapter 2: Financing Options

Overview

The balance of this Guide presents investment financing and contractual options. Energy projects are often more financially attractive when financed through multiple investment-financing instruments. Options for combining financing mechanisms are only limited by the creative structure of the project. They can include, for example, utility incentives combined with energy performance contracting or debt financing.

Capital for energy-efficiency improvements is available from a variety of public and private sources, and can be accessed through a wide and flexible range of financing instruments. As one of the most critical elements in carrying out energy improvements, financing options can significantly affect both the kind and depth of measures that will ultimately be installed. This Chapter summarizes financing options for energy-efficiency retrofits, and provides relevant public- and private-sector examples.

While variations may occur, three general financing mechanisms are available for investments in energy efficiency. These include internal financing, debt financing, and lease or lease-purchase agreements — options that can often be used in a complementary fashion. The three financing options are described below:

- **Internal Financing –** Improvements are paid for by direct allocations of revenues from an organization's currently available operating or capital funds. Allocations are usually made for specific projects as a part of an organization's annual budgeting process.
- **Debt Financing –** Capital is acquired through simple loans, bonds, or other debt instruments. Debt principal and interest are repaid incrementally over an agreed upon period, and guaranteed by the full faith and credit of the borrowing organization, and/or by revenues derived from energy-cost savings.
- **Lease or Lease-Purchase Agreements –** Equipment and improvements are acquired from a private vendor who may finance them internally or through a third party. Up-front outlays are not required from the building owner. The vendor's costs are repaid in installments over the term of the lease through the energy-cost savings from the project.

With these options and the flexibility they offer, lack of capital should not be a constraint for a soundly defined energy-efficiency project. The real constraint is more likely to be lack of knowledge about investment options, and the manner in which a viable financing package should be structured.

The basic principles for each investment option will be familiar to financial officers in most organizations, and are relatively simple to initiate and implement. Once again, it is important to note that these financing mechanisms are not mutually exclusive. The most appropriate set of options will depend on the type of organization (public or private), size and complexity of the project, internal capital constraints, in-house expertise, and other factors.

Internal Financing

Internally financed energy-efficiency improvements are paid directly with available cash drawn from an organization or building owner's current operating or capital funds. Internal financing is the simplest and most direct way to pay for improvements. One attraction of internal financing is that it allows the organization to retain all energy-cost savings and any benefits from equipment depreciation. It also allows quick project implementation by avoiding complex contract negotiations or transaction delays often associated with other financing mechanisms. However, available internal funds are commonly constrained by budget limitations and competing operating and capital investment needs.

Internal operating funds are most commonly used to finance smaller, short-term projects. These projects often have relatively low capital costs and short payback periods. Some organizations have used cash from operating budgets to start revolving investment funds, or more extensive capital budgeting programs.

How It Works

The use of internal financing normally requires the inclusion and approval of energy-efficiency projects within an organization's annual operating and capital budget-setting process.

- **Operating Budgets** – Small projects with high internal rates of return can be scheduled for implementation during the budget year for which they are approved.

- **Capital budgets** – Large projects can be scheduled for implementation over the full time period during which the capital budget is in place[1]

Budget constraints, competition among alternative investments, and the need for high rates of return can significantly limit the number of internally financed energy-efficiency improvements. Nevertheless, internal financing should support at least part of an organization's investment portfolio.

The Importance of "Hurdle Rates"

"Hurdle rates" increasingly drive investment decisions. As discussed in Chapter 1, hurdle rates reflect a minimum internal rate of return or payback period. Projects either go forward or are turned aside as a result of meeting or not meeting the minimum "hurdle rate". These rates and how they are stated can vary significantly among public- and private-sector organizations; examples include the following:

- Local governments in a midwestern state are allowed to pursue all retrofit measures with a six-year average payback (roughly a 16% annual rate of return).
- One U.S. insurance corporation requires a minimum annual 30% pre-tax return, or a minimum 20% after-tax return for any energy-efficiency project it undertakes.
- Individual building owners often require that internally financed energy-efficiency improvements have a simple payback period not longer than two years.

While achieving a targeted minimum rate of return is important regardless of how an energy-efficiency improvement is financed, that rate will generally be higher for projects that are internally financed. Success in financing improvements from internal funds will require a clear demonstration that the investment exceeds the established hurdle rate. A more compelling argument for those improvements can be made by showing profitability in terms of NPV – an important analysis that too often is not performed.

[1] Most local governments and many private firms have multi-year capital budgeting requirements (e.g., a five-year capital improvements plan and a one-year capital budget).

Revolving Investment Funds

To capture the profitable returns from energy-efficiency investments, some organizations have created revolving investment (or loan) funds that can significantly leverage financing for internally-financed projects. In this approach, an initial investment of internal money is made for one or more energy-efficiency projects. As savings accrue from avoided energy costs, some or all of the savings are earmarked for repayment to the revolving fund, thus replenishing the initial investment. Any surplus savings in excess of costs are profits that allow the fund to grow even larger. These may be reinvested in additional energy projects. As the energy savings compound, so do the returns to the fund and the profits that can be reinvested. Even with small initial capital resources, revolving funds can grow quickly through reinvested revenues (see Internal Financing Profiles "City of Phoenix, Arizona," on page 28).

The main drawback with revolving funds is the relatively long period of time required to realize the full savings of energy upgrades. However, use of internal financing combined with a revolving investment fund can provide excellent capital leveraging and a remarkably profitable return on investment.

Advantages and Disadvantages

Internal operating funds have a number of advantages and disadvantages which are discussed below.

Advantages of Internal Financing

- Simple to administer
- No financing costs (i.e., interest or transaction fees)
- Internal retention of all savings from increased energy efficiency
- Resultant internal retention of all tax benefits from equipment depreciation
- Resultant savings which:
    - decrease operating expenses in future years
    - retain all or a portion of savings in a revolving fund for additional projects
- Quick implementation of viable project opportunities

Disadvantages of Internal Financing

- Constrains maximum energy and dollar savings (when only non-comprehensive projects are affordable)
- Competes with other operating and capital investment needs
- Has the highest investment hurdle rate of any financing mechanism
- Requires in-house energy audit, project design, cost estimation, and operation and maintenance skills

Examples of Internal Financing

Many local governments and public institutions have financed energy-efficiency improvements with internal funds. The following internal financing profiles, discussed on the following page, illustrate a range of strategies for internal financing:

- Montgomery County, Maryland
- Philadelphia, Pennsylvania (School District)
- City of Phoenix, Arizona
- City of Portland, Oregon

Montgomery County, Maryland

Program Structure

- Department of Public Works and Transportation manages the "Saving Energy Through Design" program that targets new and renovated buildings
- Promotes energy-efficient design, lighting, HVAC, and district heating and cooling

Financing Method

- "Capital Savings Re-Investment Plan" — Energy savings flow back into county operating budget
- Plan allocated 10% of energy budget ($46 million) to energy retrofits

Energy Savings

- 35% in retrofitted community centers
- 60% in retrofitted police stations
- 27% in new facilities

Cost Savings

- 50% on retrofits from control systems and lighting
- 102% on lighting upgrades alone — 1-year payback
- $700,000 per year expected savings from retrofits

Philadelphia, Pennsylvania (School District)

Program Structure

- "Save Energy Campaign"
- School committees identify no- and low-cost energy measures
- 25% of each school's savings are allocated to school maintenance department to ensure staff "buy-in"

Financing Method

- Revolving fund for school energy-efficiency projects
- Energy savings are shared among each school (40)%), the District's general fund (40%), and the revolving fund (20%)

Energy Savings

- Measured savings in excess of $85 million since 1983
- 1984 baseline consumption
- Consecutive 3-year rolling baselines since 1984

Cost Savings

- Initial $3 million savings resulted from behavioral changes of building managers and occupants

City of Phoenix, Arizona

Program Structure

- Revolving fund program invests in building retrofits and energy-efficient equipment in newer city buildings
- City sets energy policy goals

Financing Method

- Revolving fund ($750,000 cap) in place since 1984
- Initially begun with $50,000 investment derived from $150,000 energy savings

Energy Savings

- Documented savings of $27 million, including $4 million for lighting alone
- Focus on no- and low-cost measures recommended by energy audits

Cost Savings

- 225% return on investment throughout program
- $27 million savings compared to $12 million project implementation costs

City of Portland, Oregon

Program Structure

- Each City bureau supports staff position to conduct energy audits and provide technical assistance
- Marketing and funding opportunities addressed

Financing Method

- Energy Savings Fund supported by 1% assessment on each of the City bureau's annual energy bills
- Annual budget of $70,000
- Additional $750,000 Loan Program (bond sale) offers 3.86% funds for energy projects
- Loan repayment from energy savings

Energy Savings

- $130,000 annually from loan program

Cost Savings

- Return on investment exceeded 25% for lighting retrofits achieved on certain city buildings

Debt Financing

Debt financing can be as simple as a loan from a lending institution to a borrower, or as complex as a bond issued and marketed to investors in the open market. Both approaches can be used to finance energy-efficiency improvements that are beyond the size and scope of internal financing. Loans are generally used to finance smaller, short-term projects. Bonds are more appropriate to raise capital for large single projects, or to support a series of smaller projects where the principal amount borrowed is of sufficient size to justify the expense of the bond's issuance and marketing costs. State and local governments can issue tax-exempt bonds or other debt instruments at substantially lower interest rates than are available to private entities. All savings from debt-financed efficiency measures are retained internally. Equipment depreciation and interest costs are tax deductible by the borrower.

Debt financing for small energy-efficiency improvements is relatively uncommon among private organizations and local governments. Issuing bonds to finance large energy-efficiency initiatives or to provide reduced rate loans for private firms, non-profit organizations, and local governments is a more common practice among agencies of state government.

How It Works

Debt financing typically works in one of two ways:

(1) An organization uses existing or new credit relationships with a financial institution that result in a loan agreement between a single lender and a borrower; or

(2) Debt is issued in the form of bonds for which capital is raised through individual investors; like stocks, these bonds are tradable in a secondary market.

Interest rates on borrowed principal for either one-party loans or marketable bonds are a function of the tax status and creditworthiness of the borrower, the risk of the projects being financed, and the size of the amount being financed. When applied to energy-efficiency projects, debt financing has a number of specific characteristics. These are discussed below:

- Projects must be of a sufficient size and transaction cost to be considered debt-worthy. Investments must have a low level of risk.
- Energy-efficiency debt financing may be designed so that debt is issued to support a variety of capital projects of which energy-efficiency improvements are just one part (e.g., bonds issued for construction of new municipal buildings and school additions, with efficiency improvements included as a part of the project).
- Debt financing requires a guarantee of repayment that is acceptable to a lender. This guarantee is based on a combination of borrower creditworthiness, project risk, and any revenue sources or assets pledged to assure debt retirement.
- Often energy-efficiency debt financing also requires special skills from investment brokers and attorneys to negotiate interest rates and repayment terms that are acceptable to both the borrower and the lender – as well as attractive to potential investors.

Debt financing, especially when bonds are issued, is administratively more complex and costly than internal financing. Debt financing may also be restricted by ceilings imposed by corporate or municipal policy, accounting standards, and/or Federal or state legislation.

Major Types of Debt Financing

Debt financing for energy-efficiency improvements can be financed through simple two-party loans for smaller projects, or from bond proceeds issued by an organization for large or multiple projects. Brief descriptions of these two major types of debt financing, along with the primary forms of public sector "municipal" bonds follow.

Direct Loans – At its simplest, debt financing takes the form of a loan to a borrower from a lending institution. Terms for repayment of principal and interest can usually be negotiated so that savings from increased energy efficiency provide at least break-even cash flow for a borrower. Some utilities and Federal and state governments can reduce a borrower's financing costs through equipment rebates, reduced rate loans for selected improvements, and/or guarantees or insurance that lowers credit risk to a private lender. Direct, market-rate loans are rarely used by public organizations to finance energy-efficiency improvements. Likewise, private firms more commonly support efficiency improvements through internally financed reduced rate loans that are made possible by proceeds from bonds issued by States or local governments, or through leasing or performance contracting arrangements.

Municipal Bonds – Municipal bonds are long-term debt obligations of states, local governments, and their authorities and agencies. They are generally, but not always, exempt from Federal and state taxes. They are most commonly issued to finance public buildings and schools, streets and bridges, water and wastewater treatment facilities, and other major infrastructure development or rehabilitation projects. They may also be used to finance capital investments that are clearly in the public interest, such as infrastructure for economic development, housing for lower income families, and, of course, energy-efficiency improvements. Like all debt obligations, municipal bonds are essentially promissory notes that require the issuer to make scheduled interest payments at specific periods at an agreed upon interest rate, and to return the principal on the date the issue matures. The three major forms of municipal bonds are described below.

General Obligation Bonds – General Obligation Bonds (GO bonds) are legally backed by the "full faith and credit" of the issuing government. The government commits its entire asset portfolio and its general taxing powers to repay the debt obligation. Most general obligation bonds are not self-supporting, which means they have no dedicated revenue stream to repay the debt. However, some GO bonds can be self-supporting with a revenue stream designed to repay the debt – as is commonly the case for state-issued bonds used to provide reduced-rate loans for energy-efficiency improvements. Regardless of whether or not a GO bond is self-supporting, it is subject to debt-limitation ceilings imposed by policy, legislation, and/or accepted fiscal practice. Due to these constraints, GO bonds are rarely used for energy-efficiency projects.

Revenue Bonds – Often called "limited obligation bonds," the essential difference between revenue bonds and GO bonds is that revenue bonds are legally secured by a specified revenue source that is dedicated to debt repayment, rather than the full faith and credit of the issuing government. Revenue bonds are commonly used for the construction of water and wastewater treatment plants where rates paid by customers provide revenues for debt retirement. Should the specified revenue source prove insufficient to service the debt, the borrower is not legally obligated to appropriate other revenues for repayment of interest and principal. Since revenue bonds are not legally backed by the full faith and credit of the issuing government, they do not usually fall under debt-limit ceilings imposed on GO bonds.

Taxable Municipal Bonds – Most municipal bonds are exempt from Federal and state taxes. However, taxable municipal bonds may be issued when the primary beneficiaries are in the private sector, rather than government or non-profit entities. Examples include bonds issued to attract industries or to support economic development. Taxable municipal bonds are an unlikely source of capital for financing energy-efficiency upgrades within government buildings. They are more appropriate for investments in energy efficiency by private firms, or for the development of industrial parks and office developments powered by super-efficient technologies or renewable energy.

Other forms of bonds may be issued by state governments, such as private activity bonds (PABs) the proceeds of which may partially or entirely benefit private parties. A PAB may be used for financing energy-efficiency investments, but is more commonly used for mortgage guarantees, student loans, or redevelopment financing. States may also establish bond banks in the form of "designated fund pools." Designated fund pools assist local governments by providing ready access to capital financing or by purchasing the debt of current local government issues. As is the case with GO bonds, both PABs and fund pools are subject to volume-cap limits.

Advantages and Disadvantages of Debt Financing

Debt financing of energy-efficiency improvements is a viable means for acquiring capital funds. It is most commonly used by state governments which issue bonds for large energy initiatives and can take advantage of lower tax-exempt financing. With the exception of reduced rate loans that may be provided from proceeds of a state-issued bond, debt financing is often a less attractive form of financing for private organizations and local governments.

In general, bond-backed debt financing is most applicable for large individual projects or for smaller projects that can be combined into a single debt issue. For large projects, municipal bonds are the least expensive way to borrow money in private capital markets. Given tax-exempt interest rates, municipal bonds place a lower financial burden on the issuing government than do direct market rate loans. Governments using bond-backed debt financing must consider debt volume-caps and weigh the complexity of issuing bonds against the size and return of a project.

Advantages of Debt Financing

- Avoids reliance on scarce revenue from internal operating or capital budgets
- Repays financing costs from energy savings
- Allows debt repayment terms to be structured to attain a break-even or positive cash flow
- Retains all savings internally, fewer transaction and financing costs
- Provides low-cost capital for state and local governments through issuance of tax-exempt municipal bonds
- Applies especially well to financing large single projects or collections of smaller projects
- Makes low-cost loans available to other organizations

Disadvantages of Debt Financing

- Presents more administratively complex issues than does internal financing
- Precludes smaller projects due to complexity and transaction costs
- Varies financing costs according to credit-worthiness of borrower and project risk
- Constrains project worth by limiting debt ceilings (established by institutional, legislative, or accounting standards)
- Requires public referenda and approval for public-sector general obligation bonds
- Requires significant in-house financial expertise
- Incurs debt that is reflected on the issuing organization's balance sheet

Examples of Debt Financing

Bond-backed debt-financing for energy-efficiency improvements has been used with success by state governments as described in the debt financing profiles on the following page:

- State of Wisconsin
- State of Montana
- State of Oregon

The first two case studies illustrate bond-backed financing which support state owned and operated building improvements. The third case study illustrates how debt financing can be expanded to support projects that extend beyond state buildings and facilities.

Debt Financing Profiles

State of Wisconsin

Program Structure

- State of Wisconsin coordinates the "Wisconsin Energy Initiative" that has audited 50 million ft^2 of state facilities
- Program works in partnership with Johnson Control's Incorporated, Wisconsin Department of Administration, over 60 private companies, and electric and gas utilities
- Over 6,000 buildings/facilities participating in energy audits and retrofits

Financing Method

- GO bonds total $35 million
- $5 million utility rebate program provided $40 million for state facility upgrades

Energy Savings

- 21% reduction in energy use compared with 1973 consumption, despite 27% increase in building square footage during same period
- Over 636,000 pounds of PCBs recycled
- Recyclable materials recovered and re-manufactured (e.g., waste paper)

Cost Savings

- $8.1 million annual savings payback
- 4.8 year simple payback

State of Montana

Program Structure

- State agencies select candidate buildings for retrofit based on energy analyses and projected savings
- Estimated utility costs and bond repayment schedule determine selection
- Montana Department of Natural Resources and Conservation manages program at a profit

Financing Method

- $3 million GO bonds issued in 1989 to install energy improvements in state buildings
- Energy savings used to repay bond debt
- $5.5 million GO bonds issued in FY 1996-97 to support State Building Energy Conservation Program

Energy Savings

- 25% average annual energy savings in schools and hospitals

Cost Savings

- Flexible structure allows measures with unfavorable ROI to be omitted from program
- Excess savings (after payment of debt service and operating expenses) of $195,000 transferred into Montana long-range buildings program in 1994

State of Oregon

Program Structure

- "Small Scale Energy Loan Program" created in 1981
- Applicants pay a non-refundable fee of 1/10 of 1% of the loan request and an underwriting fee of 1/2 of 1% or $500 (whichever is greater)
- All but $500 of underwriting fee may be applied to loan
- Loan fee of 1% of loan amount; may be included in loan
- Program staff recommends approval based on project soundness and borrower's ability to pay

Financing Method

- GO bonds sold to state and local governments, school districts, commercial businesses, and private individuals
- Bond sale proceeds support energy-efficiency and renewable-energy projects

Energy Savings

- Local government projects include:
  - $1.2 million Washington County Waste treatment plant improvements
  - $3.25 million Medford methane recovery system
  - $2.9 million Salem methane-to-electricity project

Cost Savings

- As of May 1994, 431 projects totaling $281 million had been financed
- Savings of $38 million annual estimated savings, including:
  - $228,000 annual in Washington County
  - $194,000 annually in Medford
  - $300,000 annual in Salem

Lease and Lease Purchase Agreements

Lease and lease-purchase agreements are contracts that allow the use of equipment for a fixed period in return for a regularly scheduled installment payment. In a lease, energy-efficiency equipment is acquired and financed by a third party (the lessor) with little or no up-front cost to a customer (the lessee). Payments made by the lessee to the lessor can be spread over a period of 1 to 15 years or more. Leases can be used to obtain such equipment as vehicles, telecommunications systems, or office equipment, and can be used for single or multi-agency purposes.

Lease and lease-purchase arrangements allow a building owner or institution to avoid cash limitations associated with internal financing, as well as complex and volume-capped debt financing. Since leasing arrangements can be used for both large and small projects, they provide a flexible instrument for projects of widely varying sizes. Finally, lease financing can often be structured so that payments are considered an operating expense. This means that the value of the lease will not be carried as a debt incurred by an organization.

How They Work

Equipment is selected by the building owner and then leased from a commercial leasing corporation, bank, investment broker, or equipment manufacturer. Generally, lease terms can be designed so that energy savings will pay for at least the financing portion of the lease. Terms are normally flexible.

Individual leases can be negotiated for each efficiency improvement desired. Alternatively, a "master lease" can be negotiated as a single agreement to authorize multiple capital equipment acquisitions over time. Since a single agreement can be used to finance multiple projects, master leases reduce negotiating time, transaction costs, and allow the lessee to spread financing costs among a larger group of projects. A master lease may be very useful to a large organization or state agency that desires to provide low-cost financing of energy equipment for its own departments, agencies, and/or local governments.

Major Types of Lease Agreements

There are two broad types of leases: operating leases which are generally not considered as debt for the lessee, and can be counted as off-balance sheet investments; and capital leases which are usually considered debt obligations when the lessee is a private sector entity. Definitions and characteristics of each type of lease follow:

Operating Leases – In an operating lease, the lessor retains ownership of the equipment. At the end of the lease period, the lessee can re-negotiate and extend the term of the lease, buy the equipment at its residual fair market value, or return the equipment to the lessor. An operating lease is similar to a conventional personal lease of an automobile.

Tax benefits from equipment depreciation and financing costs accrue to the lessor. Because the lessee does not have a long-term equity interest in the equipment, the lease value and payments are not considered debt liabilities on the lessee's balance sheet. As a general rule, if the lease is designed so that the equipment and improvements leased will have significant residual value at the end of the lease period, chances are high that the lease will be considered as an off-balance sheet financing instrument.

Capital Leases – Also called a financing lease, capital leases differ from operating leases in that the lessee pays for the equipment and/or improvements in equal monthly installments over the period of the lease. Because of this structure, payments are generally higher than those for an operating lease, but the lessee can purchase the equipment at the end of the lease period for a nominal amount (often $1.00). The lessee is considered the owner of the equipment and can claim tax benefits for equipment depreciation.

Unlike an operating lease, a capital lease is considered a form of debt when the lessee is a private individual or organization. The lessee obtains the use and ownership of the equipment (an asset) at the end of its term after making monthly lease payments that include principal and interest. If financing is being provided to a state or local government, a capital lease may be called a municipal lease-purchase agreement; under certain conditions this may still be considered as an off-balance sheet financing instrument that is not debt.

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Guaranteed Savings Leases – A guaranteed savings lease may be either an operating or a capital lease in which the lessee is guaranteed that payments will not exceed energy savings generated by the leased equipment. Payments to the lessor are structured so that if savings are less than those guaranteed, the lessee pays the smaller amount (the amount saved) and receives credit for the difference. Many energy performance contracting agreements are guaranteed savings leases. Energy performance contracts are described in Chapter 3 of this Guide.

Municipal (or Tax-Exempt) Lease/Lease-Purchase – Both operating and capital leases can be made available to tax-exempt entities at significantly lower financing rates than for private-sector borrowers. Since the lessor is not required to pay federal or state taxes on that portion of the lessee's payments that represent interest, a lower rate can be offered than for other types of leases. Municipal leases were developed as an alternative to procuring equipment by internal or debt financing. Their use has increased significantly in recent years because of their flexibility and a growing need for off-balance sheet financing in response to debt limits.

Key Provisions of a Municipal Lease

A municipal lease or lease-purchase agreement will generally not be considered as debt on the government's balance sheet as long as it contains the following provisions:

- *Annual appropriation*
- *Equipment essentiality*
- *Abatement provision* (unique to California and Indiana)

An annual appropriation provision means that lease payments are subject to an annual budgetary appropriation, but that the government is not pledging its taxing authority as a guarantee to fully repay the lease. Technically, if appropriations are not sufficient to continue payments, the lease can be terminated and the lessor can reclaim leased equipment.

However, equipment essentiality is another important provision in the municipal lease agreement that makes this scenario highly unlikely. Most leased equipment is essential to an organization's operation. Nearly all building services equipment, including lighting, HVAC systems, and roofing are in this category. The appropriation provision allows the lease to be construed as an operating expense, since the government has not pledged its full faith and credit for repayment. But the essentiality provision means that the lessor's risk is reduced, since the equipment is essential to the proper functioning of the government, and can only be removed with great hardship.

The abatement provision structures a multi-year lease in a way that the lessee commits to make lease payments for the entire term unless the leased asset becomes unavailable for use. For example, the building equipment might be destroyed or made unavailable for use by an earthquake or flood. In such cases, a municipal lessor has the ability to abate (reduce) or stop payments altogether.

A municipal lease that has the characteristics of an operating lease is not construed as debt. Similarly, a municipal lease-purchase agreement that has the characteristics of a capital lease is also not construed as debt, and therefore does not affect a municipality's balance sheet or available debt limits, as long as certain provisions are met (See box on previous page). Municipal leases are generally subject to annual budgeting appropriations. This gives the municipality the right to terminate the lease if funds are not appropriated.

Lease Financing

There are three major methods of procuring lease financing. These include private-placement agreements, certificates of participation (COPs), and lease revenue bonds. The characteristics of these financing methods are described below:

Private-Placement Agreements – Private-placement agreements are often used for smaller projects. Capital is provided by the lessor, or by another investor, such as a commercial bank or pension fund. These leases are appropriate for energy projects in the range of $50,000 to $500,000. Interest rates on private-placement agreements are generally higher than for other arrangements because the project risk is borne by a single investor.

Certificates of Participation (COPs) – For larger projects, COPs can be used to obtain financing from multiple investors. COPs mitigate project risk to each individual investor and usually result in lower interest rates than privately placed leases. COPs are sold in the open market as securities and therefore require the involvement of a number of specialists such as underwriters, bond counsel, and others. These requirements add to financing costs, making this option less viable for small projects. However, when larger projects are involved or when energy service agreements are negotiated, COPs are very attractive.

Lease Revenue Bonds – Lease revenue bonds are limited obligations of the lessor that are payable from and solely secured by the lessor's right to receive lease payments from the rental payments of the public lessee. Repayment comes from an identifiable stream of revenue, such as water and sewer charges incurred for a new plant.

Advantages and Disadvantages of Loan and Loan-Purchase Financing

Lease and lease-purchase agreements are especially attractive when internal financing is not possible, and when debt must be kept off the balance sheet. Leases are relatively simple to implement and can be applied to both small and large projects. As a caution, auditors may occasionally rule that a lease obligation is on-balance sheet debt regardless of how carefully a lessee has structured the lease. If keeping the lease obligation as an off-balance sheet and non-debt agreement is important, ensure that you get sound advice from financial experts when you structure your lease or lease-purchase agreement.

Municipal tax-exempt leases may be a very good option for government organizations because they provide access to large sums of capital at highly competitive interest rates. Municipal leases are best used to finance essential building equipment.

Advantages of Lease and Lease-Purchase Financing

- Avoids tapping internal funds or increasing debt
- Generates energy-efficiency improvements savings which repay financing
- Suits both small and large projects
- Has a lower tax-exempt interest rate than is usually available to public or institutional borrowers

Disadvantages of Lease and Lease-Purchase Financing

- Has complex administration and higher financing costs
- Varies financing costs according to credit-worthiness of borrower, risk and term of the project, and other factors
- Requires in-house project design and financial expertise
- Requires specific provisions for lease to be legally considered an off-balance sheet liability

Examples of Lease and Lease-Purchase Agreements

Lease and lease-purchase agreements may be used to finance energy-efficiency improvements in both private- and public-sector organizations. The three municipal lease profiles that follow illustrate results from leasing agreements used by state and local governments and private building owners.

State of Iowa Facilities Improvement Corporation

Program Structure
- Non-profit, state supported corporation identifies and implements energy improvements in state buildings/facilities through lease-purchase arrangements

Financing Mechanism
- Corporation provides energy improvement leases; lease agreements provide maximum security to bond holders

Cost Savings
- 10 year ROI – 35%
- $27 million investment in state facilities returned $6 million per year
- Average cost savings are 117% of lease value

United Unions Building Washington, DC

Project Structure
- 170,000 ft^2 facility was audited to determine lighting and HVAC system improvements

Financing Mechanism
- $890,000, 10-year municipal lease at 10% interest from First Municipal Leasing Division, Banc One Leasing Corporation
- $162,000 per year energy savings
- Lender payments of $89,000 per year

Cost Savings
- Simple Payback – 5.5 years
- IRR – 12.7%
- NPV - $105,420
- ROI of 82%

City of Buffalo

Project Structure
- 55 buildings included in lease portfolio with the following equipment or improvements:
  – Lighting
  – High-efficiency motors
  – HVAC upgrades
  – Building controls/systems

Financing Mechanism
- $3.5 million tax-exempt municipal lease-purchase financing from Oppenheimer & Co.
- Additional $1.2 million incentives from Niagara Mohawk

Cost Savings
- $6.1 million energy savings over 15-year period
- 8.6 year simple payback
- 12% rate of return

Chapter 3: Energy Saving Performance Contracts

The Basics of Performance Contracting

An energy saving performance contract ("performance contract") is an agreement between a building or facility owner and a performance contractor. Energy conservation measures (ECMs) are designed and installed by the contractor who guarantees their performance. A building owner, contractor, or a third party provides financing through one or more of the financing options described in Chapter 2. Performance contracts can also incorporate utility incentives or government subsidies that may reduce a project's total cost.

Performance contracts are structured so that the cost of implementing ECMs is recovered from savings created by those measures. Performance contracts can be used to reduce energy use and costs in existing equipment, upgrade capital equipment, and improve the maintenance of existing facilities. A "shared-savings" agreement is a performance contract where cost savings from efficiency improvements are shared between the building owner and the performance contractor according to a formula set when the agreement is negotiated.

Coverage and Contract Period

Performance contracts can cover simple projects that affect only a part of a building's energy infrastructure, or larger, more complex projects that address all aspects of energy-related performance in multiple buildings or facilities. Performance contracts can also provide continuing operations and maintenance services.

The term of a performance contract commonly ranges from five to ten years for a simple project. The term can extend to 20 years or more for larger projects when substantial capital is invested, or when the facility owner wishes to outsource all building services. Contracts normally have buy-out provisions should the facility owner wish to terminate the agreement prior to its end date.

Parties Involved in a Contract

Performance contracts in which the performance contractor directly finances improvements typically involve only the facility owner and the performance contractor as parties to the agreement. However, some financing agreements may also include independent financiers or third-party professionals responsible for monitoring and verifying project performance. The roles and responsibilities of each party involved in performance contracting are described below.

- **The Owner** – The facility owner determines project objectives, designs a request for proposals (RFP) to implement the objectives, and selects a performance contractor whose offerings are best able to complete the work at a reasonable cost. For example, some owners may be primarily interested in replacing old, inefficient equipment (infrastructure renewal), while others may have stronger interests in saving energy, improving occupant comfort, or finding off-balance sheet investment capital.
- **The Performance Contractor** – The performance contractor provides assistance in identifying and capitalizing on energy-saving opportunities, and implements the ECMs and other services specified in the contract. ESCos are contractors with the resources to package project engineering, financing, construction, and maintenance.
- **The Financier** – The financier provides capital to support costs of equipment and services provided through a performance contract. Any one or a combination of the financing options outlined in Chapter 2 can provide this capital. Generally, one party is responsible for providing all capital for the design, installation, and commissioning of the proposed energy-savings measures, as well as for assuring that cash flow is adequate for initial operations.
- **The Monitor** – The monitor is a technically qualified professional who is independent from both the owner and contractor. Monitors establish a baseline against which performance improvements are assessed, define monitoring protocols to measure and verify improvements, and may be retained to provide on-going performance monitoring.

How Performance Contracting Works

In choosing a performance contractor, a building or facility owner carefully evaluates the total combined energy savings and performance value of each firm's offerings, with consideration given to both basic features and any proposed special services.

While most performance contracting firms provide similar services, their offerings can vary significantly in scope and approach, especially when accommodating special needs. Performance contractors have a great deal of flexibility when negotiating contractual agreements. This flexibility enables building owners to have their site-specific needs met.

Basic and Special Contract Features

Performance contracting firms offer a relatively standard set of basic services. However, some firms offer special features that can significantly improve a basic performance contract. Basic and special contract features are described below.

- **Basic Service Features** – Basic service features common to almost any performance contract include technical analyses or energy audits of a building or facility, followed by design engineering, financing, and installation or construction management for all energy-efficiency improvements. The contractor may also train facility staff in operating the installed improvements, and will generally offer to maintain those improvements and monitor their performance. The contractor provides a guarantee of minimum performance, expected energy savings, and/or expected levels of energy efficiency.
- **Special Service Features** – Special service features often add value to a performance contracting agreement. Examples of such special features include especially advanced or proprietary equipment or control technologies, regular equipment upgrades during the term of the contract, and waste management and disposal services. While some features are offered to increase or ensure the persistence of energy savings, others may add value by improving the functionality of a building or advancing environmental protection mandates.

Service Options and Flexibility

Performance contracts can be structured to provide a variety of features and services. The building owner should negotiate a final agreement that provides the best total value to the owner and a reasonable return to the contractor. These negotiations should include discussions on the length of the contract, fees, performance guarantees, the types of services provided by the contractor, the number and types of facilities the building owner wants improved, and availability of service expansion.

- **Scope of Services** – The scope of services provided to the owner can range from comprehensive "turnkey" services (these include all basic and special service features) to individual services that provide less extensive support. Service coverage may address only one building, be limited to a designated set of buildings, or include all buildings owned by an organization. Applications may cover existing buildings or may extend to planned renovations.
- **Contract Type** – While a performance contract that provides improved equipment and maintenance guarantees is recommended, a building owner may choose to do without these services, and procure equipment through a lease, lease-purchase, or similar financial arrangement.
- **Guarantee** – The performance guarantee specifies a minimum level of energy efficiency, a specific dollar amount of energy savings, or a combination of both for a specific contract. In most cases the performance contractor's compensation is tied to guaranteed performance levels, and specific agreements provide incentives for higher levels of facility or building system performance.
- **Financing** – The performance contractor may be required to finance all improvements and services from his or her own sources if capital costs must be kept off the building owner's balance sheet. For state and local governments, public revenue sources such as public capital or operating funds and public capital pools may provide the necessary financing. While lower interest rates for public financing can often reduce total project costs, debt may then have to be placed on the owner's balance sheet, thereby extending the contract procurement period.

Before negotiating service options, a building owner should decide how much contract flexibility is desired within the contract, how quickly the improvements are needed, and whether on- or off-balance sheet financing is required. A building owner should also be aware of the effect of the selected options on both the quality of the initial improvements and the continuing persistence of resulting savings.

When is a Performance Contract Appropriate?

In general, a performance contracting arrangement is appropriate for projects that can: (a) produce reliable, significant, and long term energy-related cost savings; and (b) capture all economically viable energy system improvements in an organization's entire stock of buildings and facilities. Because performance contracting offers continuing operations and maintenance services, it provides a valuable opportunity to capture long-term savings that may accrue to an organization.

Performance contracts are essential to organizations that:

- Lack necessary technical expertise
- Need to free up in-house resources for other priorities
- Lack the time to supervise or manage comprehensive improvements
- Are unwilling or unable to finance the initial costs of those improvements

Determining whether a performance contract is appropriate for an organization's needs often depends on project size, the number of measures to be installed, and long-term building use. These factors are discussed below:

- **Project Size** – Project size is one determinant of whether a performance contract is the best financing measure for a particular investment. While performance contracts are generally most appropriate for larger buildings or a set of buildings, smaller projects can also benefit from an effectively executed program. Carrying out smaller trial projects to test whether performance contracting is the best financing option is often a sound procedure when performance contracting is being considered for a large project that will address an organization's entire stock of buildings and facilities.

- **Multiple Measures** – Multiple measures can improve all energy-using systems within a building (i.e., lighting, heating and cooling, controls, etc.). Performance contracts often contain measures with short-term paybacks that offset improvements with long-term paybacks. Multiple measures with a composite economic payback of up to 7 years and individual measures with longer paybacks should be considered when the expected life span of the measure exceeds its cost-recovery period.
- **Stable Building Use** – Building use is another determinant of the efficacy of performance contracting. Improving buildings through the use of performance contracts is generally more appropriate for buildings that have relatively stable use and occupancy during the contract period. Major changes in building use may significantly affect energy consumption and require modifications to the originally agreed-upon baseline, and/or savings and performance guarantees negotiated with the contractor.

Building owners considering multi-building projects should establish a master financing agreement with a single firm. Bid specifications should detail the extent of the contracting effort. Often, multi-building project financing significantly reduces transaction time and costs for both the building owner and performance contractor.

Verifying Performance and Savings

Since improved energy performance is the cornerstone of an energy performance contract, it must include a quantitative methodology to assess project success. The performance of installed ECMs and the savings that accrue through increased efficiency are normally quantified through measurement and verification methods agreed upon by the contractor and the facility owner. These methodologies address contingencies – such as changes in utility rates, or variations in building use and occupancy – that may affect performance during the contract term.

Basic Principles

To determine total savings from improvements and services provided through a performance contract, the parties to the contract must first agree on a "baseline" for energy use, operations and maintenance costs, and any other ancillary activities that have been carried out in a building before improvements are installed. These factors must then be measured again after installation ("post-installation") of the retrofit measures and services. The measurements should be continued over time to ensure that savings and benefits persist, and that appropriate adjustments can be made to accommodate variations in weather or changes in a building's use, occupancy, or operating schedule. Performance improvements and savings are the difference between the baseline and post-installation measurements.

Measurement and Verification Protocols

The U.S. Department of Energy (DOE) has been spearheading a collaborative effort with the ESCo industry, financial institutions, and others over the past two years to reach a consensus on a national methodology for measurement and verification. This effort has resulted in the International Performance Measurement and Verification Protocol (IPMVP). IPMVP provides specific guidance to building owners, state and local governments, ESCos, and financiers on how to quantify performance and energy savings from investments in energy conservation measures. It provides guidance for negotiating contract terms that will ensure a project achieves or exceeds its goals of saving money and improving the environment. Familiarity with and use of the IPMVP is highly recommended as a key part of any building improvement project.

General information about the IPMVP, the full protocol, and updates can be downloaded from the internet at **www.bmvp.org/**. This site offers practical guidance on measurement and verification of energy and water efficiency projects and maintains complete and current information on measuring the benefits from energy-conservation measures.

The Solicitation and Selection Process

A number of factors should be considered in the competitive evaluation and selection of performance contracting services. The minimum requirements for a competitive solicitation and evaluation are described briefly on the following pages.

The Request for Proposal (RFP) Document

A building owner should design an RFP that will allow an objective assessment of the qualifications and experience of a performance contractor. The RFP should request that the performance contractor outline the specific approach his/her firm will take to implement improvements. The RFP should include the major elements listed below:

- **General Requirements** – The main text of the RFP should describe the general scope of services desired and the procurement process for those services. Attachments should describe evaluation criteria, a schedule of the evaluation and selection process, and any special terms and conditions that the selected contractor must meet.
- **Contractor Qualifications and Approach** – Specific requirements must be included to guide contractors in describing their firms' qualifications, expertise, and experience in meeting the general requirements stated in the solicitation. Contractors should be required to include their proposed approach to the design, financing, installation, and performance guarantee of energy-efficiency improvements.
- **Building Profile Data** – Building profile data should be contained in a technical appendix to the RFP. This appendix describes the physical characteristics, operations and maintenance data, energy use information, current energy-systems descriptions, and known improvement opportunities for each candidate building.

The Selection and Negotiation Process

Building owners, working with an evaluation team, should evaluate written responses to the solicitation and perform oral interviews with contractor representatives who receive high rankings on the basis of their written proposals.
A contractor should be selected only after completing an oral interview. Negotiation and final approval of an energy services agreement are made only with that top-ranked contractor.

The timeframe for the entire process from issuance of a solicitation through final negotiation and approval of an energy services agreement may range from several months to a year or more, based on project size, complexity, and the structure of the evaluation process. If an energy services agreement is already in place, a much shorter timeframe will be needed to negotiate and approve later agreements that expand the performance contract to additional buildings or facilities.

Advantages and Disadvantages of Performance Contracting

Performance contracting has a number of advantages and disadvantages. Four general features of a typical performance contracting agreement clearly illustrate the advantages. These include the following:

- **Accountability** – The performance contractor is the single point of financial and technical accountability for all project measures.
- **Risk Reduction** – By guaranteeing a minimum level of performance, the contractor takes away much of the risk of project non-performance from the building or facility owner.
- **No Capital Outlay** – Capital investments by the owner can be eliminated in performance contracting arrangements. The contractor can recover capital outlays through operating budget savings. In this case, all contractor outlays are considered "off-balance sheet" costs to the building owner.
- **Levelized Cash Flow** – Payments for services are generally structured to maintain a constant (or levelized) fee schedule funded fully or in part from savings realized by the building or facility owner.

In spite of their clear advantages to building owners, performance contracting arrangements have several drawbacks that should be addressed when selecting financing options. These include the following factors:

- **Long Contract Term** – While shorter timeframes are possible, performance contractors will typically seek contractual arrangements of between 5 and 10 years with the customer — a duration that can be difficult for some local governments.
- **Higher Project Costs** – Costs associated with the performance guarantee and other services provided by performance contractors will typically increase the cost of a project by 10 percent or more over an in-house approach.
- **Comparative Evaluations** – Because services, features, and guarantees may vary significantly among performance contractors, comparing their offerings may be difficult.

Examples of Performance Contracting

Performance contracts have been widely used by both private and public sector organizations. The four examples that follow describe initiatives carried out in a private office building, a major state university, a hotel, and a Veterans Affairs medical center. The following initiatives are discussed below:

- Community Towers Office Complex – San Jose, California
- University of Rhode Island – Kingston, Rhode Island
- Hyatt Regency Hotel – Buffalo, New York
- West Haven Veterans Affairs Medical Center –West Haven, Connecticut

Community Towers Office Complex San Jose, California

Program Structure

- Office complex consists of two privately-owned bank buildings totaling 350,000 ft^2
- Retrofits improved comfort, quality, and marketability
- Installed measures included high efficiency lighting systems, domestic water heaters, two 275-ton CFC-free rotary screw chillers, a central plant digital control and monitoring system, and variable volume air systems with zone controls
- Owners reversed their initial decision to sell buildings once improvements were made and building became more profitable

Financing Approach

- Energy saving performance contract provided by Viron Energy Systems
- Contract design included building analyses, systems engineering, construction management, training, monitoring, and maintenance
- $1.4 million project financing arranged by private building owners (owners negotiated less expensive financing than performance contractor could obtain)
- $260,000 in utility DSM rebates added to project financing
- Financing term – 7 years

Energy Savings

- Electricity and natural gas savings were 36% and 27% per year, respectively
- Decrease in baseline electric consumption from 2.5 million kWh to 1.6 million kWh of electricity and from 55.5 K-Therms to 40 K-Therms of natural gas per year

Cost Savings

- Energy-cost savings over first 7 months of 1995 totaled $101,000
- Positive cash flow, including costs of equipment, installation, maintenance, financing, and energy from project startup

Performance Contracting Financing Profiles, continued

University of Rhode Island Kingston, Rhode Island

Program Structure

- 73 buildings with over 3 million ft^2
- Installed measures included lighting, HVAC, and water heating efficiency, renovation of district steam system, pipelines, and installation of four cogeneration units ranging from 60 kW to 180 kW

Financing Approach

- Performance contract provided by NORESCO
- Contract design included both technical and financial services.
- Total financed project cost - $5.5 million, with $400,000 in utility-provided lighting rebates
- Short payback improvements (lighting) combined with long payback improvements (steam pipes) in a ten year financing package
- Financing package used 20% of projected energy savings to payback costs, building owners retain 80%
- Efficiency improvements and displacement of purchased electricity both produce energy savings

Energy Savings

- Net energy demands reduced by nearly 9 million kWh of electricity, and 490,000 gallons of oil equivalent

Cost Savings

- $5.5 million investment saved over $1 million per year in energy costs

Hyatt Regency Hotel Buffalo, New York

Program Structure

- 17-story, 400-room hotel with complex operating hours and comfort requirements
- Installed measures included variable speed drives for ventilation, water pumps and cooling towers, loop heat recovery system, DDC energy management system, and complete high-efficiency lighting retrofits

Financing Approach

- Energy performance contract provided by Power Systems Solutions
- Contract design guaranteed stringent comfort standards required for guests
- Total project costs financed over a 4-year term, with only a portion of savings used to make finance payments
- Ownership of improvements revert to hotel after four-year period

Energy Savings

- Guaranteed minimum savings of 1.4 million kWh annually (at least $101,000)

Cost Savings

- Installation of improvements in Spring 1994 resulted in approximately $160,000 savings per year
- The hotel has enjoyed a consistently positive cash flow from the project

West Haven Veterans Affairs Medical Center West Haven, Connecticut

Program Structure

- Replacement of 8,500 lighting fixtures, installation of new cooling system 800-ton centrifugal chiller, 1,000-ton steam absorption chiller, and hot water tank replacements

Financing Approach

- Shared savings administered and financed by EUA Cogenex Corporation
- Cogenex financed $3.9 million up-front
- Includes $400,000 in utility rebates from Southern Connecticut Gas and United Illuminating Company
- 16-year contract period

Energy Savings

- 23% kWh per year savings for chillers and cooling retrofits (1.8 million ton hours per year from chilled water savings alone)
- 7,000 MMBtu savings from water tank retrofits
- 150 MMBtu savings from air conditioning air handlers

Cost Savings

- Contractor retains 90% of energy savings medical center retains 10%
- Contractor receives 25% of "over-baseline savings" and medical center receives the remainder
- Medical center's share of energy savings is $880,000 over 16 years
- $220,000 annual lighting savings
- $32,860 annual cost savings

Chapter 4: State and Utility Programs

State Programs for Financing Energy Efficiency

A number of states have developed initiatives to finance sound energy improvement projects. Some projects that were initially designed to reduce energy costs in state-owned buildings and facilities have expanded to local governments, universities and colleges, and small businesses. Many of these expanded state programs have improved local government operations, increased housing affordability, and provided educational opportunities.

State programs provide a credible foundation upon which local programs can be built, and often include technical analysis and investment approaches which are tailored to meet the needs of both public sector managers and small business owners. At the local level, such support is often the deciding factor in whether to proceed with a project. State programs also assist investors by tapping into resources offered by federal programs. Shared financing can reduce the investment risk inherent in energy-efficient technologies and building-system improvements.

What Services are Offered?

State programs offer a number of services to local government agencies and private building owners who are interested in initiating energy-efficiency activities. Among them are:

- Identifying projects with high potential payoff
- Conducting initial energy analyses
- Defining energy conservation measures or opportunities
- Negotiating advantageous financing arrangements

Working together, state and local government agencies and private sector building owners and managers can engage in long-term planning and comprehensive building and facilities upgrades. In addition, states can offer their large-scale purchasing power and "full faith and credit" to assist localities with financing their energy projects.

For example, the Nebraska Energy Office offers a program of reduced-rate loans and mortgage incentives to encourage major building retrofit projects while demonstrating the commercial viability of new energy-efficient and renewable technologies. The Nebraska Energy and Dollar Saving Loan Program, in partnership with private financial institutions, provides financial assistance for energy improvements to state and local government agencies, and private and non-profit building owners. Despite paperwork demands and state qualification requirements which have somewhat hampered widespread implementation, the program has maintained a successful track record (see box on facing page).

Any difficulties in program implementation at the local level can be resolved by the availability of state expertise and resources for technical and financial assistance. The number of building-efficiency improvements supported by state programs is impressive, and provides successful examples of cost-effective investments in energy efficiency.

Examples of State Programs

Three successful state programs are described on the following pages:

- The Iowa Energy Bank
- State of Texas and City of Austin's LoanSTAR Revolving Loan Program
- Nebraska's Reduced Rate Loans and Mortgages

State Program Profiles

The Iowa Energy Bank

Program Structure

- The Iowa Energy Bank is administered by Iowa Department of Natural Resources
- Authorizes lease-purchase arrangements to finance energy projects in schools, public/non-profit buildings, and local government agencies
- 22 counties and 63 cities participating
- Plant upgrades, water/waste treatment facilities, weather-stripping, lighting, swimming pool covers

Financing Mechanism

- $300 billion private underwriting provided by Norwest Investment Services
- Oil overcharge funds and short-term, interest free loans for energy audits and engineering analyses in state and local government buildings
- Private financing through local financial institutions
- Average loan period not to exceed 6 years

Energy Savings

- $48 million invested in energy improvements

Cost Savings

- $7 million annual savings

State of Texas and City of Austin's LoanSTAR Revolving Loan Program

Program Structure

- Loan to Save Taxes and Resources (LoanSTAR) established in 1988
- Austin Revolving Municipal Energy Fund finances energy improvements in state and local buildings
- City of Austin joined LoanSTAR in 1996 to replace air conditioning units in firestations, and retrofit lighting systems in a city building and garage

Financing Mechanism

- Repayment managed through agreements between Austin Department of Planning, Environment, and Conservation Services and building owners
- Annual shared payments repay state loans

Energy Savings

- Savings calculated by Fast Accounting System for Energy Reporting computer program
- Savings verification through LoanSTAR Monitoring and Analyses Program at Texas A&M
- Annual repayments equal verifiable savings

Cost Savings

- $50 million invested in LoanSTAR to date
- Estimated savings of $250 million over next 20 years

Nebraska's Reduced Rate Loans and Mortgages

Program Structure

- Nebraska Energy and Dollar Savings Loan Program
  - Self-perpetuating funding source for public and private sector energy improvements
  - State oil-overcharge funds leverage low-interest loans from private lenders (6% or lower)
- $200,000 investment made in 1995 for State Office Buildings in Lincoln with funds from the Nebraska Building Renewal Task Force, the Building Division Operating Fund, and the Nebraska Energy Office
  - Energy savings estimated to repay investment in 6 years
- New Energy Efficient Mortgage Program offers reduced interest loans for new and existing homes that meet or exceed Nebraska Model Energy Code
  - Three-tiered incentive program for new homes, ranging from .25% to 1% interest rate reduction, depending on whether home meets or exceeds code
  - Existing homes qualify for .25% interest rate reduction
  - House plans and existing homes must be rated by State Energy Office to qualify
  - Maximum mortgage amount - $500,000

State Programs, continued

Financing Mechanism
- Loans available for qualified projects from private financial institutions
- The Fund buys 1/2 of loan value to reduce interest and risk
- After installation, loan is repaid with interest; financial institution keeps interest and returns state's portion of the loan. The program can then offer new loans from these repayments.

Energy Savings
- 5% electricity and 13.5% gas efficiency improvements

Cost Savings
- Since 1990, over 10,500 loans totaling about $62 million have been made
- Over $45 million invested in home improvements ($23 million from state and $22 million from private lenders)

Utility Programs

Electric utilities and energy services companies have been key players in the energy efficiency marketplace since the early 1980's. In 1994 and 1995, for example, spending by utilities on DSM programs approached nearly $3 billion per year. However, current Federal and state policies in support of utility competition are slowing utility spending on traditional DSM programs. This trend is likely to continue.

Despite this trend, utility involvement in energy efficiency is not likely to disappear, so program support should continue to be sought. Forms of assistance are likely to change as utilities better position themselves for the challenges of a more competitive energy market. For example, utility interest in leases, market-rate loans, and energy services subsidiaries is growing.

Demand Side Management (DSM) Programs

Traditional utility DSM programs have been designed to encourage energy efficiency and peak-demand savings. Simply stated, a utility's investment in DSM measures is feasible as long as it is less expensive than building new generating plants and distribution networks. Long encouraged by Federal legislation and state public utility commissions, equipment rebates, reduced rate loans, and other DSM incentives are likely to continue in areas of the United States where generating capacity is constrained or where peak-demand is especially high.

DSM programs have relied primarily on encouraging customers to use such energy-efficient equipment (i.e., compact fluorescent lamps in commercial buildings, high efficiency motors for industry, and improved infiltration techniques in homes). Rebates on energy-efficient equipment have been relatively simple to implement, and have offered easy-to-understand incentives for consumers. Some utilities have combined these simple incentives with more sophisticated technical assistance services. The services assist major commercial and industrial concerns to plan energy systems that better match utility capacity and service structure. While some of these services will continue due to state or local mandates, their availability in most areas of the nation is likely to decline.

Reduced Interest Loans

Some states require utilities to provide below-market-rate or zero-interest loans for energy-efficiency upgrades to their public sector customers. Customers repay principal at a lower interest rate, and the utility absorbs any above-market interest differences. Where available, this is an excellent energy-efficiency financing tool for public sector customers. One such utility, Northern States Power (NSP) is funding a zero-interest loan pilot program for the City of St. Paul, Minnesota and its community partners. Total capital available for utility distribution is 2 times the city's annual electrical energy use. Annual funding is limited to $1 million annually, with loans provided on a project-by-project basis. Loans may be used to support investments that have simple paybacks of less than ten years. In 1994 and 1995, St. Paul saved $160,000 in energy costs through this program. The city estimates that it reduced CO_2 emissions by 4,000 tons as a direct result of its efforts.

Market-Rate Loans

Many electric utilities help their customers by providing financing commensurate with the perceived risk of losing market share to competitors. Utility companies appear to be increasingly interested in financing high efficiency investments, such as electric powered thermal storage chillers, in an effort to prevent customers from switching to non-electric power sources.

Market-rate loans are typically tied to the prime rate plus a certain number of points, or are indexed at a rate above U.S. Treasury notes. In offering such loans, utilities generally undertake minimal risk, especially in cases where repayments are billed monthly as part of a customer's utility bill. Services eligible for financing can range from energy audits to project management to guaranteed savings services. Some companies also offer leasing arrangements in which the utility retains title to the equipment.

Utility Financing in a Competitive Market

As restructuring of the nation's electric utility industry proceeds, the prospect for direct financing or financial assistance from utilities is not likely to grow. However, utilities will provide services that can enhance investments in energy efficiency when those services help them compete with other electric service providers. These utility services will evolve during an era of mergers, buyouts, and consolidations as electric utilities fight for assets and revenues sufficient to fend off outside threats to their markets. Three emerging trends, listed below, are especially worthy of discussion.

- Many utilities have already established unregulated subsidiaries that can function as ESCos within regional or national markets. These unregulated subsidiaries will provide services identical to independent firms within the ESCo industry.
- As competition proceeds, most utilities will be willing and able to negotiate rates for power within certain limits imposed by state legislation or market conditions. Large utility customers or aggregated groups of small customers will increasingly have the power to negotiate competitive rates and terms. Other services, including energy-efficiency improvements, may be included as part of a rate negotiation.
- To foster the transition from a regulated to a more competitive utility environment, many states or regions will provide technical and financial support designed to aid this "market transformation." Typically, such assistance will be provided to organizations on a competitive basis to support activities ranging from consumer education to demonstration of new and emerging renewable electricity generation technologies.

The trends described above will require that utilities and their customers renegotiate their traditional relationships. Because competition is proceeding at a different speed and in different forms in each state, the ability of customers to take advantage of these opportunities varies. Other alternatives will emerge as competition moves forward over the next several years.

Utility Energy Service Companies (ESCos)

In a restructured marketplace, electric utilities will unbundle their traditional full service business into separate components for electricity generation, transmission, and distribution. Generation will be the first to be competitively purchased. To foster competition, utilities or other power providers will provide energy at a "standard offer" cost. Independent power providers that can provide at a cost lower than the standard offer will be allowed to wheel power to customers over utility-owned transmission and distribution networks for a fee. In a similar fashion, the energy-efficiency services that many utilities have provided as traditional DSM services will increasingly be treated as a separate business, rather than as part of normal utility operations.

Most utilities now have the legal authority to create unregulated subsidiaries that can provide energy-efficiency services as a separate business. These subsidiaries can be created as new start-up businesses, through acquisitions, or in partnership with existing independent ESCos. Regardless of how they are created, utility ESCos provide both capital and expertise for energy-efficiency improvements.

Since cross-subsidies are prohibited between utilities and their ESCo subsidiaries, many such energy service firms may choose not to operate within the service area of their parent utility. Otherwise, the range of services and operating practices they can provide are similar to non-utility ESCos. Those services can include "turnkey" offerings that encompass facility auditing, construction, project management, third party financing, and monitoring and verification of energy savings, along with a guarantee of performance. Procedures for the solicitation, evaluation, selection, and management of contractors should be the same for a utility ESCo as they are for an independent ESCo.

Financial Support for Market Transformation

The Northwest Energy Efficiency Alliance, a coalition of investor-owned and public utilities, the Bonneville Power Administration (BPA), and public interest representatives, provides grants to private, non-profit, and local government organizations that design and implement energy-efficient market transformation projects. Market transformation is defined by the Alliance as any activity which "... encourages the market to adopt energy-efficient products and services as the industry norm. Energy-efficient market transformation is a strategic effort to induce lasting structural or behavioral changes in the marketplace that result in increased adoption and penetration of energy-efficient technologies and practices." As a non-profit corporation, the Alliance views its mission as the promotion of cost-effective electricity efficiency through market transformation efforts that would not otherwise be accomplished by the competitive market. The long-term goal of market transformation is to improve energy efficiency while at the same time reduce energy costs and environmental impacts.

To accomplish this mission, the Alliance seeks proposals from organizations within the Pacific Northwest that can significantly improve electrical use efficiency in areas ranging from lighting to office design, chiller retrofits, and commercial refrigeration systems. The Alliance's budget for 1998 - 1999 is $26.2 million, with actual expenditures determined as projects are approved. Funding for the Alliance is derived proportionally from BPA and its customers, and the investor-owned utilities of the Northwest. As a complement to this effort, individual utilities may also provide market transformation activities within their service areas, as long as they are consistent and coordinated with the goals and program elements of the Alliance.

Market transformation approaches like those of the Northwest Energy Efficiency Alliance have already been designed for the State of California and the New England region. As restructuring of the utility industry proceeds, similar initiatives are very likely to be designed for other regions of the nation.

Rate Negotiations and Market Aggregation

In an effort to keep key customers, many utilities are now negotiating power rates, services, and long-term contracts with their largest industrial, commercial, and institutional customers. Customers with the greatest leverage in these negotiations are those with large energy usage and relatively even demand patterns. While such negotiations have been most common in states and regions leading the movement toward utility restructuring (California and New England), they have also occurred and are continuing to grow in other areas across the nation. Negotiations have taken place primarily with industrial accounts, but are also gaining interest from large commercial and institutional customers including universities, colleges, and local governments.

Most negotiations result in long-term agreements for lower electricity rates. This result can aid customers in reducing operating costs, but can also serve as a disincentive for energy-efficiency investments. Customers can negotiate a full range of energy supply and conservation services. For example, the Opportunity Assessment approach being developed by the Association of Facilities Managers of Universities and Colleges, in partnership with Rebuild America, recommends that campus managers negotiate contracts that combine savings from energy-supply alternatives (like cogeneration), energy-efficiency improvements, and power-rate reductions. This approach assures that customers will obtain long-term savings while concurrently improving their operating infrastructure.

Finally, although rate negotiations or power purchases from independent generators appear most suitable for large power consumers, these options are not limited just to large organizations. Increasingly, smaller consumers are banding together in partnerships that provide an aggregated energy demand sufficient to successfully negotiate for reduced power rates and efficiency services. For example, private non-profit organizations and local governments in Massachusetts and Rhode Island are establishing associations whose purpose is primarily to negotiate for favorable wholesale power rates and energy services. Similar initiatives are beginning for small businesses and industries. In such market aggregation strategies, multiple small customers leverage their negotiating power by essentially becoming one large power customer in the view of utilities or independent power marketers.

Appendix A: Internet Resources

The following internet sites provide useful guidance and information about the Rebuild America Program and financing alternatives. Resources are grouped by the following categories: resources from U.S. DOE, other Federal agencies, and states, utilities, and associations.

Resources from U.S. DOE

Energy Efficiency & Renewable Energy Clearinghouse (General information and resources)
www.eren.doe.gov/

Rebuild America (Technical support and financing advice for community partnerships)
www.eren.doe.gov/buildings/rebuild/

Energy Fitness Program (Procedures and support for energy performance contracting)
www.ornl.gov/EFP/

Int'l Performance Measurement & Verification Protocol (Key guidance for verifying performance)
www.bmvp.org/

Federal Energy Management Program (Financing, measurement & training for federal facilities)
www.eren.doe.gov/femp/

Building Technology Center (Energy efficiency research, demonstrations and technology transfer)
www.ornl.gov/ORNL/energy_eff/btc.html

Center of Excellence for Sustainable Communities (Approaches for sustainable communities)
www.sustainable.doe.gov/

Other Federal Resources

Environmental Protection Agency (Energy Star Buildings Program — Financing and programs for energy-efficiency buildings)
www.epa.gov/energystar.html

President's Council on Sustainable Development (Policy, strategies and actions for sustainable communities)
www.whitehouse.gov/PCSD/index.html

Housing and Urban Development (Housing rehabilitation, mortgage insurance and more)
www.hud.gov/

Small Business Administration (Assistance for small businesses)
www.sbaonline.sba.gov/business_finances/pollute/all.html

Resources from States, Utilities, and Associations

National Association of State Energy Officers (State programs with links to their sites)
www.naseo.org/

National Association of Regulatory Utility Commissioners (Information on utility restructuring)
www.naruc.org/

Northwest Energy Efficiency Alliance (Market transformation incentives – interim site)
www.newsdata.com/enernet/iod/conweb/neea.html

Association of Higher Education Facilities Officers (Strategies for universities and colleges)
www.appa.org/

National Association of Energy Service Companies (Energy performance contracting)
www.naesco.org/

International Council for Local Environmental Initiatives (Local government strategies and resources)
www.iclei.org/

Public Technology, Inc. (Entrepreneurial approaches for cities and counties)
www.pti.nw.dc.us/

Lightworld's Directory (Methods and services to improve the efficiency of lighting systems)
www.lightworld.com/

Glossary

BASELINE USAGE

The calculated energy use and cost of operating and maintaining a piece of equipment, a building, or a set of buildings before carrying out any energy-efficiency improvements.

BOND

A long-term debt instrument, usually used for large capital projects, which obligates the issuer to pay back debt principal over a defined period an agreed upon rate of interest.

BOND, GENERAL OBLIGATION (GO)

A debt for which repayment of principal and interest is a general liability to the issuing organization; legally backed by the full faith, credit, and assets of that organization.

BOND, MUNICIPAL

A long-term debt instrument of a state or local government, and/or their authorities and agencies; generally exempt from Federal and state taxes.

BOND, REVENUE

A municipal long-term debt instrument that is secured and repaid from a specified stream of non-tax based sources.

CAPITAL LEASE

See Lease, Capital.

CERTIFICATE OF PARTICIPATION (COP)

A method of obtaining capital to finance large lease or lease-purchase projects; by this method, securities are sold to multiple investors on the private market.

CHAUFFAGE

A type of performance contract in which the contractor guarantees to meet certain standards for lighting, space conditioning (temperature and humidity), and other services over a period of time and at a guaranteed price.

DEBT FINANCING

Financing which is acquired through loans, bonds, or other debt instruments; debt principal and interest are repaid incrementally over an agreed-upon period, and are guaranteed by the full faith and credit of the borrowing organization and/or revenues.

DEMAND SIDE MANAGEMENT (DSM)

Energy-efficient technologies and measures that reduce the amount of electricity and/or fuel required for homes, offices, and industries.

DISCOUNT RATE

The interest rate used to assess the value of future cost and revenue streams; an essential factor in assessing true returns from an investment in energy efficiency, as well as opportunity costs associated with not making that investment.

ENERGY CONSERVATION MEASURE (ECM)

A modification to, or replacement of, a piece of equipment or building shell/ system which increases energy efficiency.

ENERGY SERVICE COMPANY (ESCo)

A company which designs, procures, finances, installs, maintains, and guarantees the performance of energy conservation measures in an owner's facility or facilities.

ENERGY SAVING PERFORMANCE CONTRACT (ESPC)

An agreement with a third party in which the overall performance of installed energy conservation measures is guaranteed by that party.

GENERAL OBLIGATION BOND (GO)

See Bond, General Obligation.

HURDLE RATE

The minimum annual internal rate of return that an investment must meet to ensure that it will be attractive to an organization in comparison with alternate investments.

INTERNAL FINANCING

Capital costs for improvements paid for by direct allocation of revenues from an organization's currently available operating or capital fund; allocations are usually made for specific projects as a part of the organization's annual budgeting processes.

INTERNAL RATE OF RETURN (IRR)

Annual rate of return from an investment based on costs (capital and operating payments) and income (energy and operating savings) discounted over the life of an improvement; the sum of discounted cash flows equals the initial investment outlay.

LEASE

An agreement that allows the use and possession of equipment and/or equipment systems from a third party in return for a regularly scheduled installment payment for over an agreed-upon period.

LEASE, CAPITAL

A lease agreement in which all costs of equipment and financing are paid by the lessee in equal installments by the end of the lease period. At the end of the period, the lessee can purchase the equipment at a nominal value (often $1.00); also called a "financing lease" or a "lease-purchase" agreement.

LEASE, MASTER

A single operating or capital lease agreement negotiated to authorize multiple capital equipment procurements over time; reduces transaction time and spreads financing costs over a larger base than possible with the procurement of separate lease agreements for individual projects.

LEASE, OPERATING

A lease agreement in which the lessee is not required to pay costs of equipment and financing at the end of the lease period. At the end of the period, the lessee may buy the equipment for its residual fair market value, or return the equipment to the lessor; also called a "true lease".

LIFE-CYCLE COST (LCC)

The total cost of acquiring, owning, operating, and disposing of a building, facility, or piece of equipment over its useful life.

MARKET TRANSFORMATION

Strategic efforts to induce lasting structural or behavioral changes in the marketplace resulting in increased use of energy-efficient technologies and practices, and adoption of energy-efficient products and services as the industry norm.

MASTER LEASE

See Lease, Master.

MEASUREMENT AND VERIFICATION

The act of obtaining and analyzing energy use and cost data to verify the performance and savings of installed energy-conservation measures.

MUNICIPAL BOND

See Bond, Municipal.

NET PRESENT VALUE (NPV)

The total present value of an investment; takes into account all discounted costs and savings over the full life cycle of the investment, measures the profitability of an investment, and allows alternate investments to be compared objectively.

OPERATING LEASE

See Lease, Operating.

POSITIVE CASH FLOW

A case in which incremental costs for repayment of an investment are exceeded by incremental savings as a result of improvements accruing from that investment; (e.g., when lease payments for new equipment are less than the energy-cost savings resulting from installation of that equipment).

PROFITABILITY

A measure of how much an investment returns over time (for both public and private organizations) versus an alternative option or no action. Net Present Value (NPV—see above) is the most complete measure of the comparative profitability of competing investment options.

REVENUE BOND

See Bond, Revenue.

SIMPLE PAYBACK

The amount of time in months or years required for an investment to recover its non-discounted initial capital cost as a result of savings from that investment.

SUPPLY SIDE MANAGEMENT

Energy supply improvements that result from increased efficiency, reduced costs of energy production, or cost-effective renewable energy development.

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Preface

Welcome to the Rebuild America Guide Series. This series of technical and business manuals is designed to meet the real-life needs of the Rebuild America community partnerships. These Guides provide clear and practical information on issues related to completing energy-efficient building retrofits. Each Guide will help partnerships make educated decisions as they move through the retrofit process. The Rebuild America Guide Series is one of the products and services that the U.S. Department of Energy provides to America's communities to help them maintain more efficient and affordable buildings.

Financing Energy Efficiency in Buildings has been written for organizations considering investments in energy-efficiency projects. It provides definitions, descriptions, and advice for implementing successful financial strategies. It describes the complete spectrum of energy-efficiency financing options, including energy saving performance contracts and state and utility incentives for financing energy-efficiency improvements.

The Rebuild America Program recommends that its partners utilize these innovative financial strategies in order to maximize benefits from energy-efficiency investments. Using this Guide will help organizations understand what financing alternatives are available to them, why a particular financing option should be selected, and how to derive maximum benefits from financing choices.

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Table of Contents

List of Acronyms

CFC	Chlorofluorocarbons
COP	Certificate of Participation
DOE	U.S. Department of Energy
DSM	Demand Side Management
ECM	Energy Conservation Measure
EMCS	Energy Management Control System
EPA	U.S. Environmental Protection Agency
ESCo	Energy Service Company
ESPC	Energy Saving Performance Contracts
GO	General Obligation (Bonds)
HVAC	Heating, Ventilating, and Air Conditioning
IAQ	Indoor Air Quality
IPMVP	International Performance Measurement and Verification Protocol
IRR	Internal Rate of Return
LCC	Life-Cycle Costs
NPV	Net Present Value
PAB	Private Activity Bonds
PCB	PolyChlorinatedBiphenyls
RFP	Request for Proposal
RFQ	Request for Qualifications
ROI	Return on Investment

List of Units

Btu	British thermal unit
ft^2	Square feet
kW	Kilowatt
kWh	Kilowatt hours
MMBtu	Million Btu