SASKATCHEWAN ENERGY MANAGEMENT TASK FORCES

TECHNICAL GUIDE

A GUIDE TO FINANCING ENERGY MANAGEMENT

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Introduction

As operating budgets continue to be strained in businesses and institutions all across Canada, increasing emphasis is being placed on decreasing costs in all areas. Each dollar which is saved from these areas, represents an extra dollar which can be put towards services or increased productivity.

For too long, energy costs have been considered a fixed cost about which the facility manager can do little. Energy management costs have, traditionally, not been evaluated in a similar manner as most common other expenditures have been evaluated (according to cost effectiveness and return on investment). Because of this, many good opportunities have been missed.

Calculating three simple ratios, for five or ten years of cost data, will reveal how energy costs have cut into funds that historically have been used for other purposes. For example, the annual energy costs can be expressed as a percentage of:

1. the total operating budget,
2. plant operations and maintenance expenditures, and
3. gross operating revenues.

It is important to realize that these same ratios are routinely calculated for labour costs, input costs and virtually every other cost associated with a commercial, industrial, or institutional facility. This information will form the basis for decisions about which areas and programs are no longer cost effective. By identifying the trend of energy costs, management can understand the savings opportunities and be more willing to devote time and resources to a comprehensive energy management program.

It is not necessary that the facility manager be helpless when it comes to controlling energy costs. Many new technological developments mean that the same energy function can be performed with a significant reduction in energy consumption.

These technological improvements can be so effective in reducing energy consumption that the wise facility manager will begin to consider them as investment opportunities. Unfortunately, very often a facility is restricted from incorporating these innovations because of financial restrictions. With energy management, however, this is less of a problem than it appears. This Guide will discuss various options that can allow a facility manager to obtain energy efficient equipment through appropriate financing. It is feasible that the cost and the financing charges can be paid out of the savings. For more information on how to evaluate energy management investments, refer to SECDA's *A Guide to the Selection of Energy Efficient Technologies*.

This guide provides information on:

- Understanding energy management financing.
- The barriers associated with financing energy management
- How various types of energy management financing work.

What is Energy Management Financing?

Energy costs consume a large sum of money every year in commercial buildings, institutions, and other facilities. If the total amount of energy consumed could be reduced, then money would be saved. In other words, finding ways to save energy is just like finding money.

Typically, money has to be spent in order to find ways to make money. When this is done in business or financial markets, it is called an investment. Saving money through energy conservation is based on the same principle. Energy conservation measures, therefore, can be regarded as *investments.*

Financing allows the organization to move outside of its capital budget and implement energy conservation measures without paying the full costs all at once. Instead, payments are spread over a period of time. The objective of energy efficiency financing is to structure the payments such that they are less than the actual energy savings. In this way, the reduction in the energy bill provides the financial resources to pay back the financing. This means that the energy savings can be used to finance the improvements. The immediate effect on cash flows is positive.

By making an investment in energy conservation, the balance sheet of the organization is being restructured. In the short term, the energy liabilities are being split into two categories: (1) energy expenses and (2) costs associated with energy conservation. However, in the long term, only the energy expenses remain after the energy conservation costs have been eliminated through periodic payments. The result is a lower total energy liability, a stronger balance sheet, and a healthier organization.

It is also important to understand the difference between energy efficiency investments and conventional investments. Energy efficiency investments do not generate revenue but rather generate cost avoidance. Therefore, as energy prices increase, total energy costs may still rise or simply be held constant. To calculate savings (costs avoided), the amount which would have been spent if no improvements were made must be determined and not what is actually being spent.

Barriers to Investing in Energy Management

Three main barriers exist which prevent organizations from investing in energy efficiency measures. These are:

- Initial costs too high.
- Risks and uncertainties too great.
- Reluctance to incur new debt.

1. Initial Costs

The first barrier which often restricts facilities from investing in energy management is that *initial costs are considered to be too high*. The facility officers believe that the capital costs required to participate in an energy management program will create too large of a financial burden.

All activities within a facility (including investment opportunities) compete for limited resources. However, energy management opportunities are often not considered as a legitimate investment option. The energy budget is treated as a fixed cost instead of as an investment opportunity. Even though energy conservation measures offer attractive returns on investment, they are often deferred in the interest of other priorities or put at the bottom of the priority list.

It is imperative that any organization's financial officers begin to understand that with proper financing, the initial costs of most energy conservation measures will not necessarily add to the further strain on the financial resources. This issue will be addresses in greater detail as the various financing options are explained.

2. Risks

The second barrier that often prevents a facility of embarking on an energy management program is that the *risks and uncertainties are considered to be too high*. In reality, the more significant question is: are the risks and uncertainties of energy management any greater than the risks and uncertainties of the *status quo* or any other investment.

Any investment which offers a return cannot be without risk. In energy conservation programs, the risks are as follows:

1. *The dollar value of energy savings is uncertain as (a) energy prices and (b) weather conditions are uncontrollable*.

   It must first be remembered that energy prices and weather variations will affect the company whether investments are made in energy conservation or not.

a. The general trend is for the price of energy to rise. While there have been marginal reductions in some commodities, in general most analysts suggest that rising prices are to be the trend. Rising energy prices will have a greater negative effect on the company if energy conservation is not undertaken. Consequently, the risk of increasing energy prices, can be viewed as a positive reason for investment in energy conservation.

b. Varying weather conditions need to be viewed as short term variations within a long term trend. There can be considerable variation from one year to the next but the overall picture is for weather patterns to remain relatively stable for the life of the facility.

   Consequently, varying weather patterns cannot be considered a risk when the lifetime of the facility and the lifetimes of the equipment are considered. The weather changes are not an argument for or against energy conservation. The more significant issue for weather is what is the type of climate in the location of the facility. The harsher the climate (heating or cooling) the more significant will be any savings produced by energy conservation measures.

2. *The performance of installed equipment may vary if use of facility changes*.

   Each facility manager must assess the effects that facility use will have on the proposed energy conservation measures. For instance, if it is known that a facility or portion of a facility will be closed-down or the use of the facility will be changed, then there would be certain technical improvements that may not be feasible to install. But if a energy conservation measure will pay for itself before the facility is closed (or changed) and there is a reasonable expected return on the investment, then it is a wise investment to go ahead with the project.

   The risk of the change of the use of a facility should not deter a facility manager from considering energy conversation improvements.

3. *Energy savings may vary depending on maintenance and operator attention*.

   It is very true that poor or improper maintenance practices and incorrect operation of equipment will have an adverse effect on the energy performance of facility equipment, but the negative effects are often reduced with efficient equipment.

   Very often the addition of new, efficient equipment can serve as incentive for staff to improve their maintenance regimes. Plus, with the purchase of some equipment, training may be included. Thus, the addition of energy efficient equipment will give staff and opportunity to learn proper operating procedures.

   So it is true that energy savings will vary as maintenance practices vary, but the negative effects of those poor practices can be reduced if not eliminated by the installation of energy efficient equipment.

4. *Actual savings may be difficult to measure if not monitored properly*.

It is very true that in some cases, actual savings are difficult to measure. It is possible that the cost of implementing an extensive monitoring program could absorb all the accrued savings from the energy efficient equipment. So what is a facility manager to do to ensure that the new equipment is actually saving energy?

This is not a new problem. A facility manager faces this performance question with all equipment installed in the facility. Does the piece of equipment perform as intended? This question does not serve as a total impediment for other equipment, why should it for energy efficient equipment?

In most cases, fully commercialized equipment that is rated as energy efficient has had extensive testing and use to ensure its viability. In lighting, for instance, all the possible fixture combinations (lamp, ballast, reflector, controls) have detailed specifications that allow the designer and facility operator to know the energy consumption before and after retrofitting. These values will ensure (within a small percentage) the actual energy and demand savings.

Other equipment may not be quite as straight forward as lighting, but the principles are the same. The biggest issue for the facility manager is the ensure that the piece of equipment to be installed is correctly specified for the intended purpose. Far too often, "efficient" equipment is incorrectly specified and/or installed. In those cases, the "efficient" could operate less effectively than the piece that it is replacing.

3. New Debt

The third barrier that often prevents facilities from investing in energy efficient products, the negative financial effects of *incurring new debt*. With continuing uncertainty in the financial markets and the political arena, many organizations are reluctant to incur new debt even if the returns on investment are high. This is indeed a serious consideration for many companies and can certainly be a tremendous obstacle. Fortunately, this is not an insurmountable obstacle. There are financing options that can reduce the burden to the organization.

The remainder of this Guide will present various options that answer this issue directly. When energy savings are used to re-pay financing, contracts can be arranged that allow for the company to not face a negative cash flow.

From the preceding discussion about barriers to energy management investments, it is clear that an energy management program can be used to creatively overcome many of the traditional obstacles to investments. It is also clear that many of the traditional concerns about energy management and energy efficient products are not as serious as originally thought.

Financing Methods

While the sources of finances are many, there are essentially four different ways to finance energy management. Each type of financing has its advantages and disadvantages. The most appropriate method of financing will depend upon the specific characteristics of the facility. Cash flow considerations, return on investment criteria, technical staff availability, and several other variables must be considered in making the choice of the most appropriate financing method. The chosen methodology is typically identified early in the energy management program decision making process.

The management style (internally managed or externally managed) and the financing methodology will have significant effects on many other decisions in the process. It is for this reason, that the financing method be chosen early and that the choice play a major role in the deployment of the program.

The four types of financing include:

1. Internal Reinvestment of Savings. (Self financing)

2. Capital Pool or Revolving Fund. (Internal Bank)

3. Third Party Financing. (Supplier or Financial Institution)

4. Energy Service Company. (ESCo)

As with any range of investment options, an organization may choose how much risk it wants to assume in the course of achieving efficiency. Under the first three financing alternatives, the facility assumes most of the risk. Under the last option, the risks are transferred to private business firms. Shifting risk to private firms will lower returns for an organization, but it may be attractive (or the only way) for some facility managers.

All options must be considered and evaluated in order for the facility manager or the energy management specialist to determine which method is best for the individual facility. Each of these four financing methods will be discussed in greater detail in the following sections.

Option 1: Internal Reinvestment of Savings - Self-Financing

This method of investing in energy efficiency measures is commonly referred to as *self-financing*. Low cost or no cost energy conservation measures are initiated and the savings which accrue over a period of time (a year or more) are then reinvested into more capital intensive measures. For example, by simply removing lights in overlit areas in year one, the savings which would accumulate over the year could be used to purchase new ballasts in year two. Self-financing is a continual process where year after year savings become greater allowing for more and more capital investment into energy conservation..

Self-financing is typically done when the audit has identified that initial savings can be achieved through or low-cost replacements or operational changes and the organization is unable to access capital funds, either internally or from an outside agent. Self financing works best when energy costs are a budget item and accumulated savings can be "banked" (internally) and used later for more capital intensive projects.

When embarking on a self-financed program, it is important to plan at least three years of the program in advance. While it is not necessary to adhere strictly to this plan, it allows for a more effective implementation strategy. Without an energy management plan, there is a tendency to do simple, short-term measures that could effectively eliminate some more effective but more costly measures later. This results in lost opportunities to save energy. For further information about this subject see the SECDA publications: *A Guide to the Selection of Energy Efficient Technologies* and the *Combining Efficient Lighting Technologies Information Sheet.*

Figure 1 shows an example cash flow of a self financing energy management program. At the beginning of the program (year one) several low-cost and no-cost measures are undertaken in the facility. These measure could include extensive delamping and several operational adjustments such as manual temperature set-back. The key feature of this application is that the facility is not required to make any extensive capital purchases. The major issue at this stage is allocating facility staff to the energy management projects.

The reduced energy costs that were achieved in the first year are “banked” and used to make capital expenditures in year two. For instance, set back thermostats, T8 fluorescent tubes, electronic ballasts, etc. In year two, savings now accumulate from the second year measures as well as the first year measures. Thus, going into year three, a larger bank of funds is available for year three retrofits.

This process continues throughout the life of the program. Figure 1 shows the amount of energy savings in one year equaling the capital expenditures of the following year. A facility will usually be limited to spending the banked savings from the previous year. For large purchases, some of each year’s savings should be set aside until the required amount is accumulated.

In this example, the total retrofit was worth $22,000 but this was extended over seven years. Energy costs are assumed to increase linearly each year at 3%.

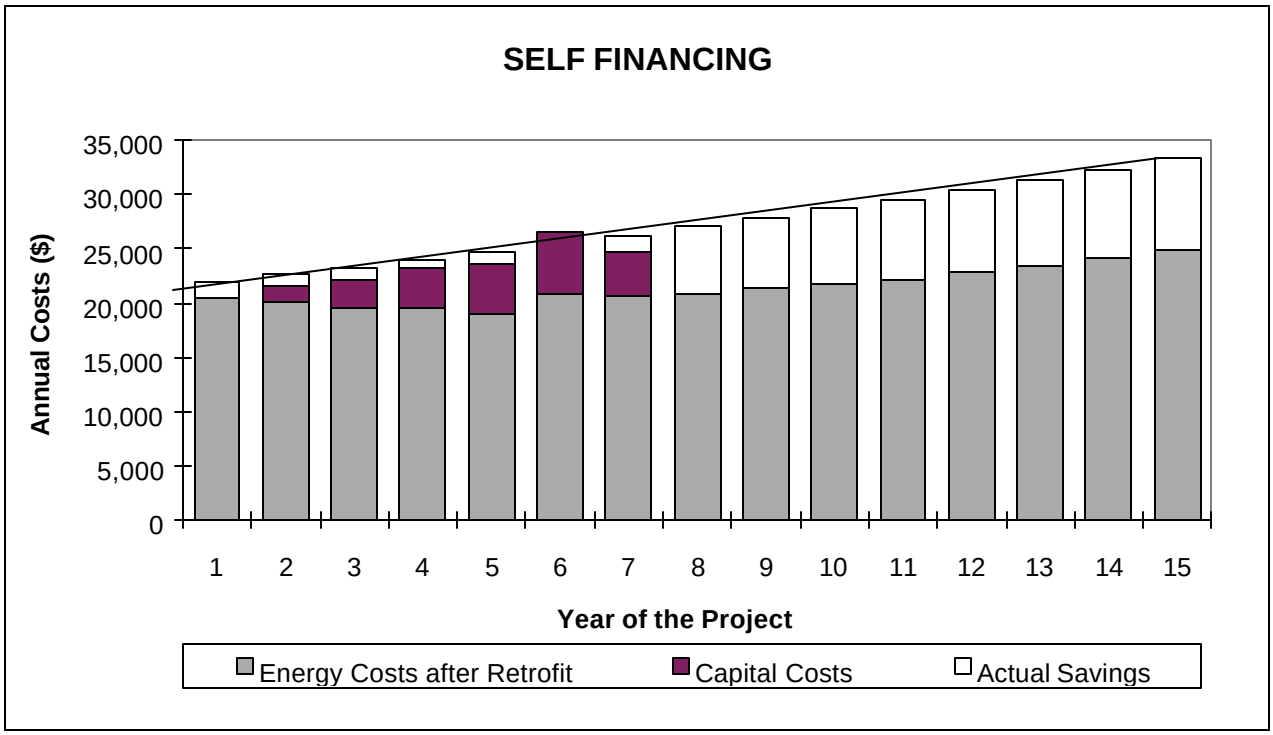

Figure 1 - Cash Flow of the Self Financing Method

The sloped line drawn near the top of each column indicates what the energy costs would have been if no efficient measures had been implemented and not capital expenditures were made. The top portion of each column indicates the energy savings that were achieved from the previous year's retrofit. It must be remembered that these savings are accumulating for each year's retrofits. So in year 5, all the previous four year's savings are also achieved. Thus, the savings and the amount that is available for reinvestment gets larger every year.

The self-financed method does not attain the savings as quickly as other methods because the energy efficient technologies are not all installed at the beginning of the program. By delaying the installation of equipment for several years, the energy savings are also delayed. But it does have the advantage of allowing the facility to learn and grow with the development of new technologies.

Advantages of Self-Financing:

- Relatively easy to implement / arrange.
- When successful, numbers exist to convert non-believers.
- Capital acquisitions of new high efficient technology may be considered after 1 - 2 years of program.
- Costs of these new technologies may be lower in the future.
- Unaffected by interest rate fluctuations.

Disadvantages of Self-Financing:

- Could result in lost opportunities to conserve energy.
- Human behaviour difficult to control / change
- Technology improvements delayed and therefore energy savings (and reduced operating budgets) are delayed.
- Reduction in operating budget does not occur until the end of the program if all savings are re-invested into the program. Some facilities will decided to extend the program and with hold a portion of the savings to have an immediate affect on the operating budget.
- Program is self-managed: projects must be identified, selected, implemented and monitored internally (no external expertise)

Key Success Factors:

- Initial actions taken must require little or no capital expenditures.
- Sufficient savings must be *created* or *engineered* so the facility can develop it's own *bank*.
- Budget must be maintained so as to calculate energy savings and accumulate savings for reinvestment.

Option 2: Capital Pool or Revolving Fund - Internal Bank

The internal bank method is similar to the concept of self financing. However, instead of having to accumulate money in the "bank" through energy savings, a revolving fund is *created* and available immediately within the organization to fund energy conservation initiatives.

For example, an organization may set aside $100,000 or more to be used for financing energy conservation projects. This is an excellent financial decision if the energy efficiency investment yields a higher rate of return than what the funds were previously earning.

Figure 2 shows the typical cash flow of the Internal Bank financing method. It is assumed that energy costs increase linearly and that all energy efficient measures are implemented at the start of the project. The revolving fund is repaid from the energy savings. In this example, the total retrofit project was worth $22,000. The energy management team agreed to repay the internal bank at 10.25 % interest over the seven years of the project. The yearly payments were calculated at $4225.

Advantages of Internal Banks:

- No lost opportunities.
- Cheapest source of financing. (No risk premiums)

- Easy to identify the rate of return on investment.

Disadvantages of Internal Banks:

- Using capital reserve which may need to be utilized elsewhere.
- Opportunity cost of not investing the money elsewhere (if a potential high return becomes available
- Program is self-managed: projects must be identified, selected, implemented and monitored internally (no external expertise)

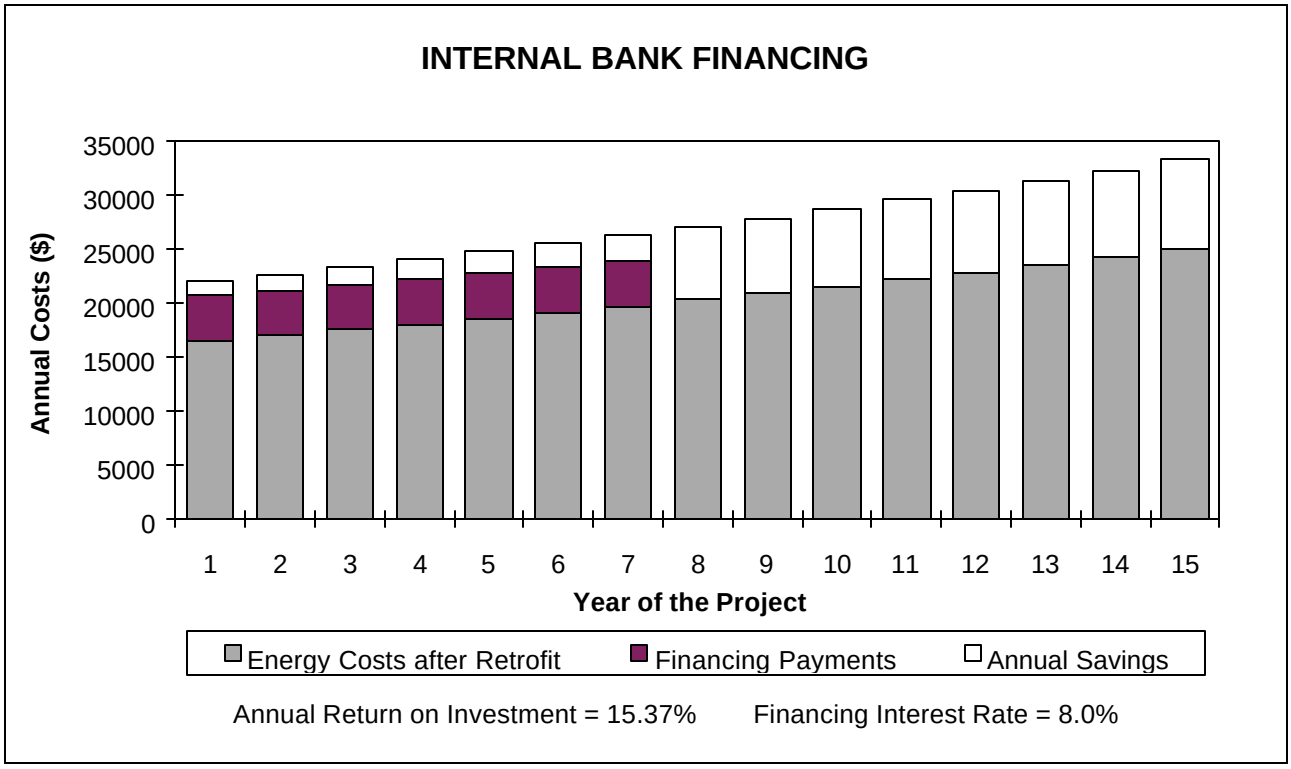

Figure 2 - Cash Flow of Internal Bank Financing Method

Key Success Factors:

- Sufficient funds must be *deposited* into the revolving fund.
- Rate of return on projects must compensate for increased level of risk.
- Projects must be closely monitored to accurately reflect energy savings and calculate rate of return.

Option 3: Third Party Financing

Third party financing is an established, familiar mechanism that can be used to fund all types of energy efficiency projects. Typical sources of third party financing can include banks, trust companies, credit unions and other private financing companies. Leasing equipment from suppliers or energy efficient products is also a form of third-party financing. It is important to recognize differences between the financing agents as interest rates can vary dramatically.

The objective with a loan or lease is to structure the loan or lease payments so that they are less than or equal to the annual savings.

All sources of third party financing will ultimately base their rates upon the organization's ability to repay. As a result, the third party method has higher rates and shorter terms and may therefore not be the best option for major projects. However, using third party financing on small, 2-4 year payback projects (e.g. lighting retrofits) may represent a good financial decision. In this way, projects can be funded as they are identified instead of postponing their implementation for packaging with a larger financing project.

Advantages

- Conserves capital (requires no money down).
- Preserves established credit.
- Flexibility to "tailor" repayments.
- Income tax considerations as the interest or lease payment can be expensed.

Disadvantages

- Increases cost of financing.
- Decreases project ROI.
- Program is self-managed: each measure must be identified, selected, implemented and monitored internally.

Key Success Factors:

- Financing agent must provide flexible repayment terms.
- Interest rates must be competitive.
- Projects must be closely monitored to accurately determine energy savings.

Figure 3 shows the typical cash flow of the Third Party financing method. It is assumed that energy costs increase linearly and that all energy efficient measures are implemented at the start of the project.

With the right contract, the Third Party (loan or lease) can be repaid from the energy savings. Typically, the interest rates that are paid to third-party financiers will be higher than those used in the Internal Bank method. The immediate return to the facility will be less than in the internal bank method but it must be recognized that with reduction in return, the facility is purchasing the capital from the third party and preserving its own capital.

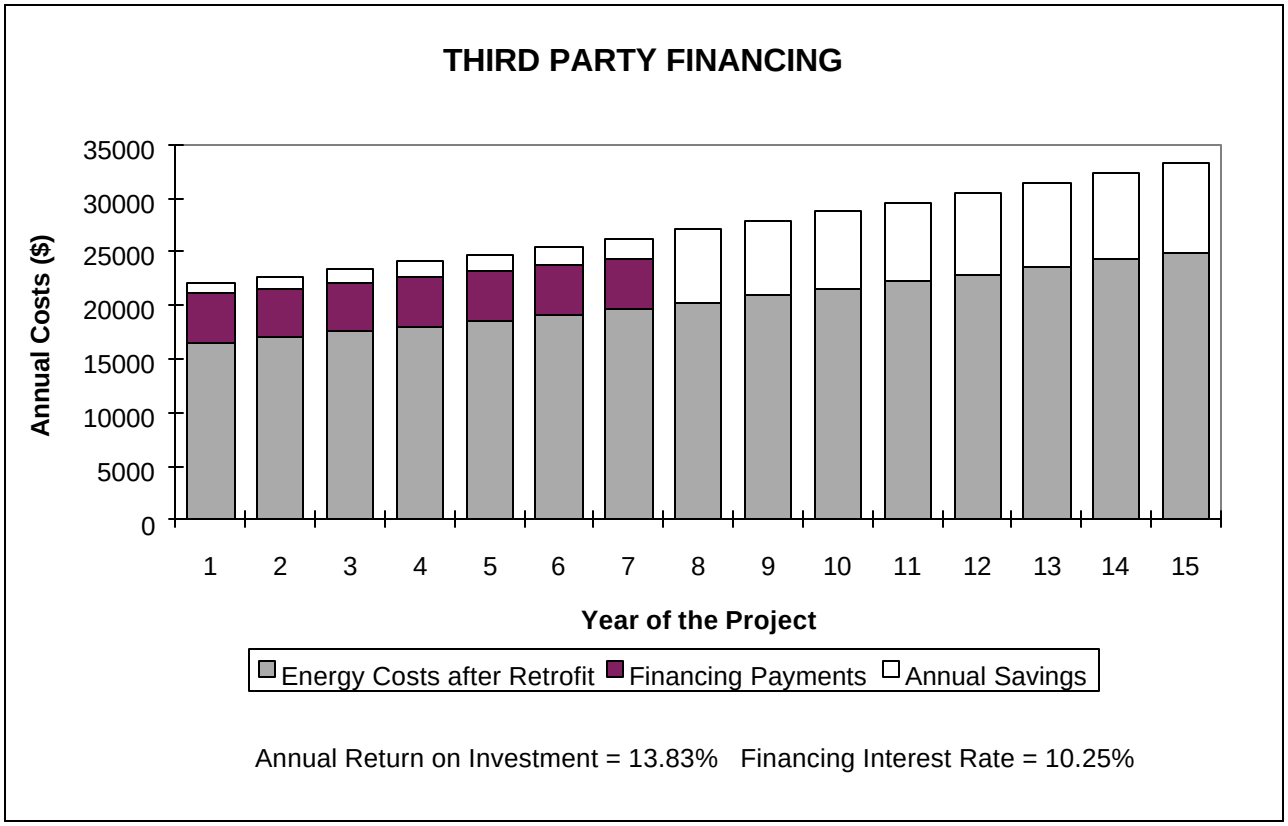

Figure 3 - Cash Flow of Third Party Financing Method

Option 4: Energy Performance Contracting

The savings available from large energy conservation projects are so great, private businesses which remove most or all of the barriers to energy management, are now active in assisting facilities to undertake an energy management program. These businesses are known as Energy Service Companies.

For many facilities, a very attractive financing method is to use an Energy Service Company (ESCo). The ESCo and the facility agree to a contract which establishes the energy performance for the facility. Unlike the previous three options, the risk is born by the ESCo who guarantees the savings from which they are paid. Transfer of the risk, however, means higher financing charges.

Energy Service Companies are turnkey contractors who accept total responsibility for analysis, design, construction, commissioning, performance monitoring and operator training. ESCos are repaid for their costs out of the savings resulting from the project. Energy service agreements usually cover the engineering design, procurement and installation of equipment and monitoring of an energy management retrofit system. There are over eighty energy service companies currently operating in Canada.

To verify the profitability of a potential investment, the ESCo must independently evaluate energy efficiency improvements. Frequently the company acts as project manager and takes the lead role in the identification and design of efficiency projects. Or a company may evaluate and then finance a project already identified by the facility. Performance contracts can be made flexible and responsive to both the facility's and the ESCo's particular requirements. A successful contract will be one that all parties participate in developing.

An ESCo will conduct a preliminary study to identify a client's energy savings potential. It will then make its preliminary proposal. The ESCo will be seeking agreement to move to the second stage: performing a thorough engineering analysis to develop a complete set of recommendations for improving energy efficiency. To move to this second stage, the ESCo will require the user to agree to pay for the energy study, although not necessarily to enter the final contract.

Once the study is made and the projects are identified, a single project or a set of projects are selected for execution and a contract is drawn. The company will install, monitor, and maintain the specified equipment until the end of the contract period, at which time the building owner will take ownership of the equipment in the manner described in the contract.

The performance contract must address several key issues. There are typically six aspects involved in the ESCo approach:

1. Identification of inefficient energy usage (audit).
2. Construction and commissioning.
3. Changing the system design.
4. Operating procedure revisions.
5. Effective maintenance and repair procedures.
6. Proof of savings.

There are three generic types of energy service agreements:

1. First Out - the ESCo retains 100% of the energy savings until it is paid out.

2. Shared Savings - the ESCo and the energy user each receive a fixed percentage or dollar value of the energy savings over the life of the agreement.

3. Chauffage (guaranteed benefits) - the energy user pays the ESCo a fee equal to its energy bills before the project less an agreed upon discount of five to ten percent and the ESCo pays the users energy bills.

One of the most attractive features of a typical ESCo project is that no up-front costs are incurred by the client energy user. Up-front capital is provided by the ESCo (either through their own capital or financed arranged capital) and the cost of the capital is spread out over the length of the contract through the service payments.

With the right arrangements, the ESCo assumes many of the risks of the success of the installation. The client is only required to pay a percentage of what it saves. If no savings are realized, no payment is due.

Figure 4 shows the typical cash flow of the ESCo (Energy Performance Contracting) financing method. It is assumed that energy costs increase linearly and that all energy efficient measures are implemented at the start of the project. The ESCo is repaid from the energy savings. Interest rates are higher than in the other methods and there are usually additional administrative costs. This method takes the longest to reduce the energy budget for the investing company. If this figure is compared to the figures of the previous financing methodologies, it is clear that using an ESCo will reduce the energy costs of this company only a small amount in the first few years. But this company is "buying" some very important benefits for the additional costs including the transfer of risk to the ESCo.

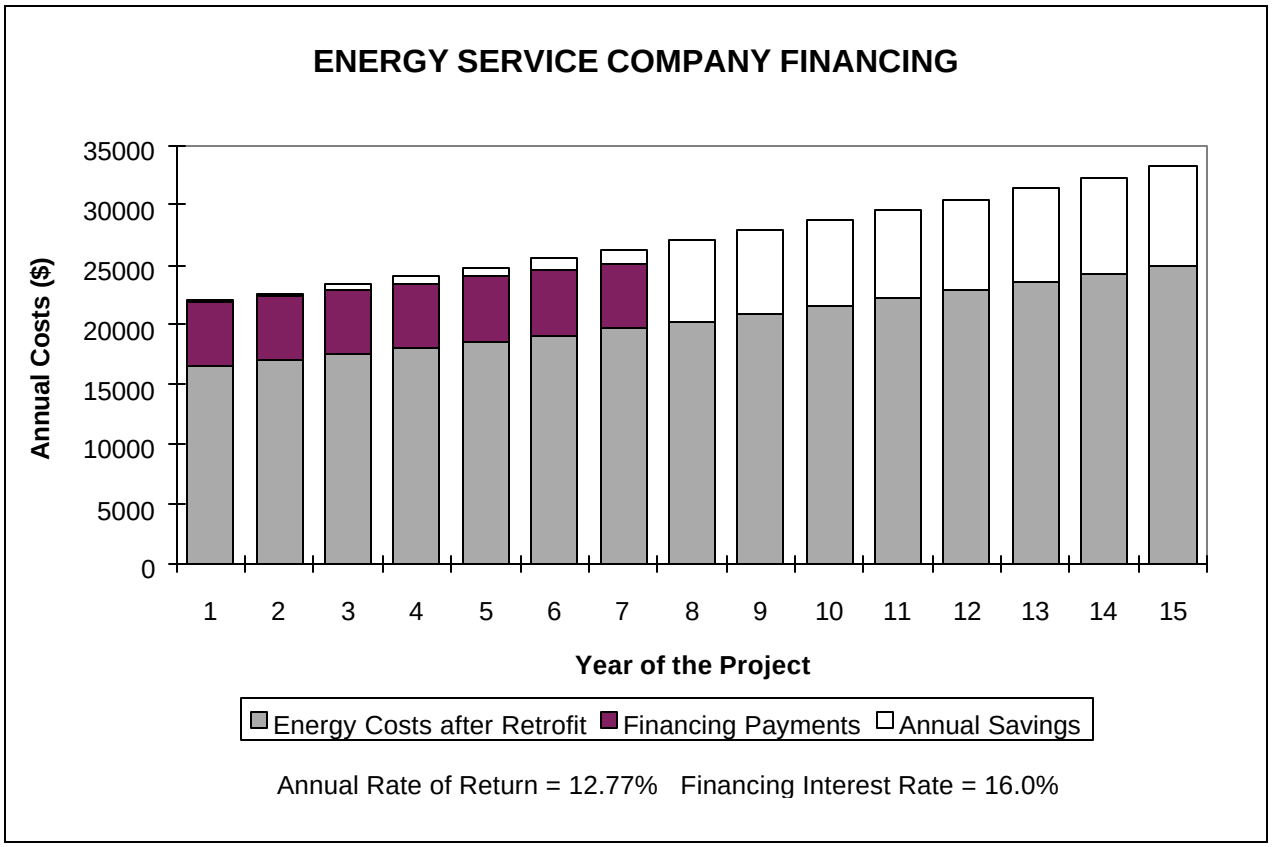

Figure 4 - Cash Flow of Energy Service Company Financing Method

Advantages

- Energy retrofit at virtually no up-front cost.
- External technical assessment
- No down payments.
- Simplified accounting.
- Energy service contract may guarantee savings (i.e. reduced risk for the facility).

Disadvantages

- Highest cost source of financing.
- Sacrificed some energy savings to ESCo.
- Some loss of control over project.

Key Success Factors:

- ESCo must be reputable.
- Project must be of adequate size to warrant involvement of ESCo.
- Role of ESCo must be well understood by energy user.

Summary

Energy Management financing allows a business or institution to move outside of its capital budget and implement energy conservation measures without paying the full costs at the beginning of the project. Instead, payments are spread over a period of time. The objective of energy efficiency financing is to structure the payments (principal and interest) such that they are less than or equal to the actual energy savings. In this way, the reduction in the energy bill provides the financial resources to finance the project. This means that the energy savings are used to finance the improvements. The immediate effect on cash flows is positive.

The traditional barriers to energy management (initial costs too high, risks and uncertainties are too great, and the reluctance to incur new debt) can all be overcome through several financing methods.

The Internal Reinvestment of Savings means that no financing is required. It will take longer to establish significant energy savings, but it can all be done in-house. An Internal Bank allows the organization to make significant investment returns through energy management without the need to externally finance the efficient measures. Third-party Financing (loans and leases) can be used effectively if the repayment plan does not exceed the annual energy savings. For many companies, Energy Performance Contracting is becoming the preferred method because it does not require in-house energy management expertise and all risk can be transferred tot he ESCo. With the energy performance method, immediate returns might be exchanged for the ESCo management.

Further information about energy management programs are available in other SECDA publications. SECDA has a set of technical information sheets about efficient lighting, efficient motors, and energy management in general. As well, there are several other guides related to the subject. *A Guide to the Selection of Energy Efficient Technologies* explains the criteria used to evaluate and compare the best energy management investments. *A Guide to Setting Up an Energy Management Program* outlines the steps involved in a comprehensive and extensive program of energy management. *A Guide to Monitoring and Evaluation of Energy Management in Commercial and Institutional Facilities* describes the necessary components to ensure that an energy management program has produced the appropriate results.