

BEYOND
SMART CITIES

**ENERGY SAVINGS PERFORMANCE AND
MEASUREMENT & VERIFICATION
ONLINE TRAINING COURSE**

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**FINANCIAL MANAGEMENT - CASH FLOWS
FOR ENERGY PROFESSIONALS**

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WHAT SHOULD YOU LEARN

Internal rate of return, Cash flows,
Risk and sensitivity analysis
Financing options, Energy
performance contracts and role of
ESCOs.

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CASH FLOWS

Generally there are two kinds of cash flow; the initial investment as one or more instalments, and the savings arising from the investment. This over simplifies the reality of energy management investment.

There are usually other cash flows related to a project. These include the following:

- ❑ Capital costs are the costs associated with the design, planning, installation and commissioning of the project; these are usually one-time costs unaffected by inflation or discount rate factors, although, as in the example, instalments paid over a period of time will have time costs associated with them.
- ❑ Annual cash flows, such as annual savings accruing from a project, occur each year over the life of the project; these include taxes, insurance, equipment leases, energy costs, servicing, maintenance, operating labour, and so on. Increases in any of these costs represent negative cash flows, whereas decreases in the cost represent positive cash flows.

CASH FLOWS +

Factors that need to be considered in calculating annual cash flows are:-

- ❑ Taxes, using the marginal tax rate applied to positive (i.e. increasing taxes) or negative (i.e. decreasing taxes) cash flows.
- ❑ Asset depreciation, the depreciation of plant assets over their life; depreciation is a "paper expense allocation" rather than a real cash flow, and therefore is not included directly in the life cycle cost. However, depreciation is "real expense" in terms of tax calculations, and therefore does have an impact on the tax calculation noted above. For example, if a Rs.10,00,000 asset is depreciated at 20% and the marginal tax rate is 40%, the depreciation would be Rs.200,000 and the tax cash flow would be Rs.80,000 and it is this later amount that would show up in the costing calculation.
- ❑ Intermittent cash flows occur sporadically rather than annually during the life of the project, relining a boiler once every five years would be an example.

SENSITIVITY AND RISK ANALYSIS

Many of the cash flows in the project are based on assumptions that have an element of uncertainty. The present day cash flows, such as capital cost, energy cost savings, maintenance costs, etc can usually be estimated fairly accurately. Even though these costs can be predicted with some certainty, it should always be remembered that they are only estimates. Cash flows in future years normally contain inflation components which are often "guesstimates" at best. The project life itself is an estimate that can vary significantly.

Sensitivity analysis is an assessment of risk. Because of the uncertainty in assigning values to the analysis, it is recommended that a sensitivity analysis be carried out - particularly on projects where the feasibility is marginal. How sensitive is the project's feasibility to changes in the input parameters? What if one or more of the factors in the analysis is not as favourable as predicted? How much would it have to vary before the project becomes unviable? What is the probability of this happening?

SENSITIVITY AND RISK ANALYSIS +

Suppose, for example, that a feasible project is based on an energy cost saving that escalates at 10% per year, but a sensitivity analysis shows the break-even is at 9% (i.e. the project becomes unviable if the inflation of energy cost falls below 9%). There is a high degree of risk associated with this project much greater than if the break-even value was at 2%.

Many of the computer spreadsheet programs have built-in "what if" functions that make sensitivity analysis easy. If carried out manually, the sensitivity analysis can become laborious - reworking the analysis many times with various changes in the parameters.

Sensitivity analysis is undertaken to identify those parameters that are both uncertain and for which the project decision, taken through the NPV or IRR, is sensitive. Switching values showing the change in a variable required for the project decision to change from acceptance to rejection are presented for key variables and can be compared with post evaluation results for similar projects.

SENSITIVITY AND RISK ANALYSIS +

For large projects and those close to the cut-off rate, a quantitative risk analysis incorporating different ranges for key variables and the likelihood of their occurring simultaneously is recommended. Sensitivity and risk analysis should lead to improved project design, with actions mitigating against major sources of uncertainty being outlined

The various micro and macro factors that are considered for the sensitivity analysis are listed below.

Micro factors

- ❑ Operating expenses (various expenses items)
- ❑ Capital structure
- ❑ Costs of debt, equity
- ❑ Changing of the forms of finance e.g. leasing
- ❑ Changing the project duration

MACRO FACTORS

Macro economic variables are the variable that affects the operation of the industry of which the firm operates. They cannot be changed by the firm's management. Macro economic variables, which affect projects, include among others:

- ❑ Changes in interest rates
- ❑ Changes in the tax rates
- ❑ Changes in the accounting standards e.g. methods of calculating depreciation
- ❑ Changes in depreciation rates
- ❑ Extension of various government subsidized projects e.g. rural electrification
- ❑ General employment trends e.g. if the government changes the salary scales
- ❑ Imposition of regulations on environmental and safety issues in the industry
- ❑ Energy Price change
- ❑ Technology changes

The sensitivity analysis will bring changes in various items in the analysis of financial statements or the projects, which in turn might lead to different conclusions regarding the implementation of projects.

FINANCING OPTIONS

There are various options for financing in-house energy management

1. From a central budget
2. From a specific departmental or section budget such as engineering
3. By obtaining a bank loan
4. By raising money from stock market
5. By awarding the project to Energy Service Company (ESCO)
6. By retaining a proportion of the savings achieved.

SELF-FINANCING ENERGY MANAGEMENT

One way to make energy management self-financing is to split savings to provide identifiable returns to each interested party. This has the following benefits:

- ✓ Assigning a proportion of energy savings to your energy management budget means you have a direct financial incentive to identify and quantify savings arising from your own activities.
- ✓ Separately identified returns will help the constituent parts of your organization understanding whether they are each getting good value for money through their support for energy management.
- ✓ If operated successfully, splitting the savings will improve motivation and commitment to energy management throughout the organization since staff at all levels will see a financial return for their effort or support.
- ✓ But the main benefit is on the independence and longevity of the energy management function.

ENSURING CONTINUITY

After implementation of energy savings, your organization ought to be able to make considerable savings at little cost (except for the funding needed for energy management staff). The important question is what should happen to these savings?

If part of these easily achieved savings is not returned to your budget as energy manager, then your access to self-generated investments funds to support future activities will be lost. And later in the program, it is likely to be much harder for you to make savings.

However, if, an energy manager, has access to a proportion of the revenue savings arising from staff's activities, then these can be reinvested in:

- ✓ Further energy efficiency measures
- ✓ Activities necessary to create the right climate for successful energy management which do not, of themselves, directly generate savings
- ✓ Maintaining or up-grading the management information system.

ENERGY PERFORMANCE CONTRACTING AND ROLE OF ESCOS

If the project is to be financed externally, one of the attractive options for many organizations is the use of energy performance contracts delivered by energy service companies, or ESCOs.

ESCOs are usually companies that provide a complete energy project service, from assessment to design to construction or installation, along with engineering and project management services, and financing. In one way or another, the contract involves the capitalization of all of the services and goods purchased, and repayment out of the energy savings that result from the project.

In performance contracting, an end-user (such as an industry, institution, or utility), seeking to improve its energy efficiency, contracts with ESCO for energy efficiency services and financing

In some contracts, the ESCOs provide a guarantee for the savings that will be realized, and absorbs the cost if real savings fall short of this level. Typically, there will be a risk management cost involved in the contract in these situations. Insurance is sometimes attached, at a cost, to protect the ESCO in the event of a savings shortfall.

ENERGY PERFORMANCE CONTRACTING AND ROLE OF ESCOS

Energy efficiency projects generate incremental cost savings as opposed to incremental revenues from the sale of outputs. The energy cost savings can be turned into incremental cash flows to the lender or ESCO based on the commitment of the energy user (and in some cases, a utility) to pay for the savings.

WHAT ARE PERFORMANCE CONTRACTS?

Performance contracting represents one of the ways to address several of the most frequently mentioned barriers to investment. Performance contracting through an ESCO transfers the technology and management risks away from the end-user to the ESCO.

For energy users reluctant to invest in energy efficiency, a performance contract can be a powerful incentive to implement a project. Performance contracting also minimizes or eliminates the up-front cash outlay required by the end-user. Payments are made over time as the energy savings are realized.

What is Performance Contracting?

The core of performance contracting is an agreement involving a comprehensive package of services provided by an ESCO, including:

- ♦ An energy efficiency opportunity analysis
- ♦ Project development
- ♦ Engineering
- ♦ Financing
- ♦ Construction/Implementation
- ♦ Training
- ♦ Monitoring and verification

Monitoring and verification, is key to the successful involvement of an ESCO in performance contracting where energy cost savings are being guaranteed.

ESCOs are not “bankers” in the narrow sense. Their strength is in putting together a package of services that can provide guaranteed and measurable energy savings that serve as the basis for guaranteed cost savings. But, the energy savings must be measurable. The Figure 6.1 shows ESCO Role.

ESCO ROLE

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graph LR; EndUser[End - User] -- "Provision of engineering, turnkey equipment installation and monitoring services" --> ESCO[ESCO]; ESCO -- "Variable performance -or savings- based energy payments" --> EndUser; ESCO -- "Investment Agreement" --> Fund[Fund or Financial Intermediary]; Fund -- "Provision of capital for project costs" --> ESCO;
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