

## Financial aspects of Energy Management in buildings – a summary

### INTRODUCTION

Many businesses, where directors can choose from a wide array of investment opportunities, give energy a far lower priority than is justified. This is because investment in energy efficiency is regarded not only as discretionary, but high risk as well. To compensate for this, high rates of return are required from energy efficiency investment.

This is not the case in the most energy efficient organisations. Here, investment in energy efficiency is considered alongside core business investment and the risks are properly evaluated. As a result, required rates of return are lower, and more investments are made in energy efficiency projects.

When an organisation signs the Energy Efficiency Office's 'Making a Corporate Commitment' campaign, a natural response should be for energy efficiency to move from discretionary towards core business. If your organisation has joined that campaign, you should exploit this opportunity by ensuring that senior management understand that your investment proposals are supporting the commitment they have made. Similar opportunities are available if your organisation has an energy or environmental policy.

Unfortunately, the positioning of energy efficiency projects as discretionary may not be the sole barrier to investment. As with all projects, it is essential that the proposal reaches the right level of decision-making in the organisation. For instance, a proposal which would gain senior management approval may fail to get beyond line manager level due to a number of reasons. These may include commitment to energy efficiency not being devolved throughout the organisation, localised management difficulties, or a different perception of the organisation's investment criteria.

Energy efficiency proposals must compete effectively alongside all the other calls on your organisation's available investment funds. If energy efficiency projects are to be



*With good financial management projects have already been identified when resources suddenly become available*

considered seriously, they need to be presented to management in a professional and appropriate manner.

This Guide summarises how you can make effective energy efficiency proposals and get them considered on an equal basis with other projects.

It will enable you to review how well you currently manage investment in energy efficiency, and help you to identify the areas of improvement you should concentrate on to be most effective. More detailed information will soon be available in a step-by-step Good Practice Guide 'Financial Aspects of Energy Management' (GPG 165), available from BRECSU. This, in addition to taking readers through the formal steps of financial appraisal, explains how to:

- identify investment opportunities
- overcome the low priority many organisations give to energy efficiency
- influence decision makers.

### IS ENERGY INVESTMENT ONE OF YOUR WEAK POINTS?

If, in reviewing your organisation's approach to Corporate Energy Management, you have identified investment as an area for improvement, this document will help you to achieve a higher level of effectiveness. Further information on Corporate Energy Management, including advice on making a formal assessment of the key organisational aspects on energy management, is provided in General Information Report 12: Organisational Aspects of Energy Management, available from BRECSU.

*“Effective communication of ideas to senior management is as important as the ideas themselves”*





### Financial Energy Management Matrix

	Identifying Opportunities	Exploiting Opportunities	Management Information	Appraisal Methods	Human Resources	Project Funding
4	Detailed energy surveys are regularly updated. A list of high and low cost opportunities already fully costed and ready to proceed immediately.	Formal requirement to identify the most energy efficient option in all new build, refurbishment and plant replacement projects. Decisions made on basis of life-cycle costs.	Full management information system enabling identification of past savings and continuous opportunities for investment meeting organisation's financial parameters.	Full discounting methods using internal rates of return and ranking priority projects as part of an ongoing investment strategy.	Board take a proactive approach to a long-term investment programme as part of a detailed environmental strategy in full support of Energy Manager and team.	Projects compete equally for funding with other core business investment opportunities. Full account taken of benefits which do not have direct cost benefit, eg marketing opportunities, improved working conditions.
3	Energy surveys conducted by experienced staff or consultants in buildings likely to yield largest savings.	Energy staff are required to comment on all new build, refurbishment and plant replacement projects. Energy efficiency options often approved, but no account is taken of life-cycle costs.	Promising proposals get presented to decision makers, but insufficient information (eg for sensitivity analysis) results in delays and rejections.	Discounting methods using the organisation's specified discount rates.	Energy Manager working well with accounts/finance to present well argued cases to decision makers.	Projects compete for funding from capital budget along with other business opportunities, but have to meet more stringent requirements for return on investment.
2	Regular energy monitoring/analysis identifies possible areas for saving.	Energy staff are notified of project proposals which have obvious energy implications. Proposals for most energy efficient solutions vulnerable when capital costs need to be reduced.	Adequate management information available, but not in correct format or easily accessed in support of energy saving projects.	Undiscounted appraisal methods used, eg gross return on capital.	Occasional proposals to decision makers by Energy Manager with limited success and only marginal interest from decision makers.	Energy projects not normally considered for funding from capital budget, except when very short-term returns are evident.
1	Informal, ad hoc energy walkabouts conducted by staff with checklists in the hope of identifying energy saving measures.	Energy staff use informal contacts to identify projects where energy efficiency can be improved at marginal cost. Proposals routinely rejected to reduce capital cost.	Insufficient information to demonstrate whether previous investment in energy efficiency has been worthwhile.	Simple payback criteria is applied.	Responsibility unclear and those involved lack time, expertise and resources to identify projects and prepare proposals.	Funding only available from revenue on low risk projects with paybacks less than one year.
0	No mechanism/resources to identify energy saving opportunities.	Energy efficiency not considered in new build, refurbishment and plant replacement decisions.	Little or no information available to develop a case for funding.	No method used irrespective of the attractiveness of project.	No one in organisation promoting investment in energy efficiency.	No funding available for energy projects. No funding in the past.



## REVIEWING YOUR POSITION



*Effective communication of ideas is as important as ideas themselves*

### THE PURPOSE AND PRACTICE OF FINANCIAL APPRAISAL

Financial appraisal involves finding and evaluating the best projects to invest in – whatever they are and wherever they arise. It gives energy savings the priority they merit when compared with other aspects of cost reduction or business expansion.

Often perceived as a complex procedure, financial appraisal is in fact far less forbidding than you may think. The formal procedures – which involve the use of a few simple arithmetic formulae – cover only a very small part of the overall task.

The six key steps in financial appraisal of energy efficiency investment in buildings are:

- locate the buildings which have the potential
- identify the area in each of these buildings where a saving can be made and identify the measures required to release these savings
- establish the costs and the savings for each measure and calculate the key financial indicators, such as payback and net present value
- optimise the financial return measured by these indicators for each project, and the portfolio of projects

- establish how much investment capital is available and identify new sources of capital
- decide which projects make best use of the organisation's available capital.

Taking short cuts at any one step only prejudices the outcome of subsequent steps and leads to a poorer final decision. Among the most common reasons for failure of the financial appraisal exercises are insufficient systematic trawls for energy saving opportunities, inadequate information systems, and overestimation of potential benefits.

### REVIEWING YOUR POSITION - THE FINANCIAL ENERGY MANAGEMENT MATRIX

#### HOW TO USE THE MATRIX

You can review your organisation's current approach to the financial aspects of energy management by using the Financial Energy Management matrix.

Consider each of the six columns in turn. Using a photocopy, mark the place in each column which best represents where you think you are currently located. Place your mark in the appropriate cell, or between cells if you think this is more accurate. Then join up the marks across the columns to produce a graph line. This is your matrix profile.

You can also ask your line manager and financial manager to complete the matrix, so you can compare your perceptions of current performance. Do not be surprised if these perceptions differ. By discussing your differing views, you can improve your communications and break down organisational barriers. This process of negotiation can help build a common sense of purpose as your organisation tries to improve its handling of the financial aspects of energy management.

#### IDENTIFYING AREAS FOR IMPROVEMENT

From your profile, you can assess how balanced your approach is to the managing of energy efficiency investment. Peaks will indicate where your current effort is well developed. Troughs will highlight where you are least advanced, and will help you to identify priority areas for action. You may wish to give priority to those which meet one or more of the following criteria:

- are least advanced
- are easiest to implement
- are cheapest to implement
- have most impact
- are least contentious.

Alternatively, you can decide which columns contain issues that are most important in your own circumstances. Choose the columns where you would most like to see a change or improvement. List what you see as the three main obstacles impeding your progress to the next level in each column. Then identify the key opportunities for improving your performance. With this information, you can now start to develop an action plan for improving your management of energy efficiency investment.

#### WHAT IT ALL MEANS

The two inside pages give a more detailed description of each column of the matrix. These should be used when reviewing and determining your current position in the matrix.

#### WHAT NEXT?

This document will help you to identify your own strengths and weaknesses in managing energy efficiency investment, and to highlight areas in which your organisation's performance can be improved. Further guidance is given in EEO's Good Practice Guide 165. This and other information on energy efficiency in buildings is available from BRECSU.



As illustrated in the matrix, the management information needs to be detailed enough to allow sensitivity analysis to be carried out. This is the process of testing how assumptions made in determining costs and benefits affect the cash flow statement, and thus the financial parameters of the project. This is particularly important when the assumptions may contain errors or uncertainties, such as weather variations or equipment performance.

The management information should also enable you to assess the benefits, other than reduced cost, that may occur due to the energy efficiency project. It is possible that the project was not motivated by energy savings in the first instance. Benefits likely to arise from energy efficiency investment in buildings include:

- reducing heating energy use
- reduced electricity use
- lower maintenance requirements
- reduced plant supervision
- improved comfort
- enhanced property value
- longer service life of remaining plant.

### APPRAISAL METHODS

The calculation of financial appraisal is entirely within the capacity of a competent engineer or manager.

The first step is to evaluate the cash flow. In other words, how much money will be spent, or accrue, in each year of the project. Equipped with this information, the simplest financial parameter to calculate is the payback period. Too much reliance should not, however, be placed on the payback as an initial screening method.

Four other commonly used parameters based on undiscounted cash flow are: gross return on capital, net return on capital, gross average rate of return and net average rate of return. These parameters are valuable because they take into account the earnings after the project has paid back its capital cost, which payback does not.

The time value of money is allowed for in financial appraisal by applying a discount factor to future costs and earnings (see Good Practice Guide 165). This can be applied to any of the four return on capital methods mentioned above but, in practice, it is most often applied to the net return on capital, slightly modified, to produce a parameter called Net Present Value (NPV).

NPV is of particular interest to financial managers as it is the parameter which tells them what a project will earn on top of its costs in today's money over its expected lifetime.

### HUMAN RESOURCES

A vital ingredient in bringing investment proposals through to acceptance is the commitment to energy efficiency of people at all levels in the organisation.

As well as having a member of staff responsible for promoting investment, person-to-person contact between departments helps to promote the culture of energy efficiency.

It is important, too, for you and your team to have a supportive board of directors with a proactive approach to investment as part of the organisation's detailed environmental strategy.

A clear understanding of where responsibility for energy efficiency lies is necessary. Staff and other resources should be allocated accordingly to allow you to get on with the job successfully.

Even proposals demonstrating commitment and expertise on your part may be held back purely through lack of interest from senior managers. The risk of this occurring can be minimised by involving key people within your organisation in the promotion of energy efficiency. Joining forces with the accounts/finance department can prove worthwhile.

Decision takers are usually pressed for time and will often only give proposals a quick scan. If they do not understand just one part of it, or even if they simply don't like the look of it, they may regard the proposal as not worth further consideration and reject it out of hand.

### PROJECT FUNDING

You need to locate all opportunities in your area of the business and to put forward a steady stream of well prepared proposals. Whatever their merits, some of these are going to be turned down. This is a necessary consequence when the organisation is making choices and you should not be discouraged by it.

To minimise the risk of projects being rejected, it is necessary to ensure that projects are judged on an equal basis with other investment opportunities elsewhere in the organisation.

In many organisations, investment in energy efficiency is viewed as discretionary and hence does not get considered on an equal basis with core business investment. As a result, the required payback periods are short, or investments need to achieve a high rate of return.

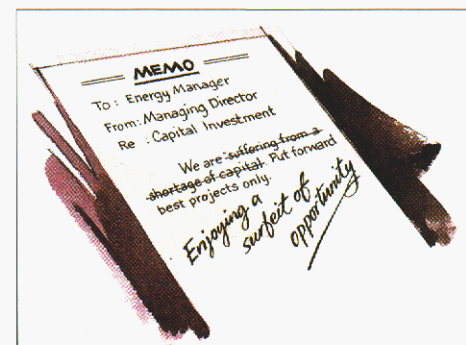
In addition, investment in energy efficiency is seen as risky and unlikely to achieve the expected savings. Again, high rates of return are required to compensate.

Aim to get energy efficiency investment considered as a part of core business. This will be easier if your organisation has an energy or environmental policy with board level backing.

Show that you have taken account of potential risks and carried out a sensitivity analysis. Also consider using a capital return budget to keep track of the investment and accrued year-on-year savings (refer to panel on back page). By showing the benefits which have resulted from previous investments in energy efficiency, you will be able to argue that the risks involved in new investment need not be high.



No matter how good a project is, it can be held back by poor presentation



Organisations can often identify more energy saving projects than they have capital to fund



### WHAT IT ALL MEANS

#### IDENTIFYING OPPORTUNITIES

Identifying suitable projects for investment requires:

- access to information
- the means to analyse it, and
- the ability to use it.

To identify the most likely areas for saving energy, you need to know which buildings are using energy efficiently, and those which are not.

A very simple information system, based on accounting and management information that has already been collected, can help you. It should show how much energy is consumed, the fuel type and the cost. It should also show where the energy is used.

Comparing annual energy use with yardsticks published by the Energy Efficiency Office in its 'Introduction to Energy Efficiency' series and Energy Consumption Guides will show which buildings are high energy users. You then need to identify specific savings opportunities.

Some opportunities can be spotted by examining monthly consumption data. Others may be found through a physical survey. The 'Introduction to Energy Efficiency' series and the Energy Efficiency Office's Fuel Efficiency Booklet 1B - 'Energy Audits in Buildings' show how to start.

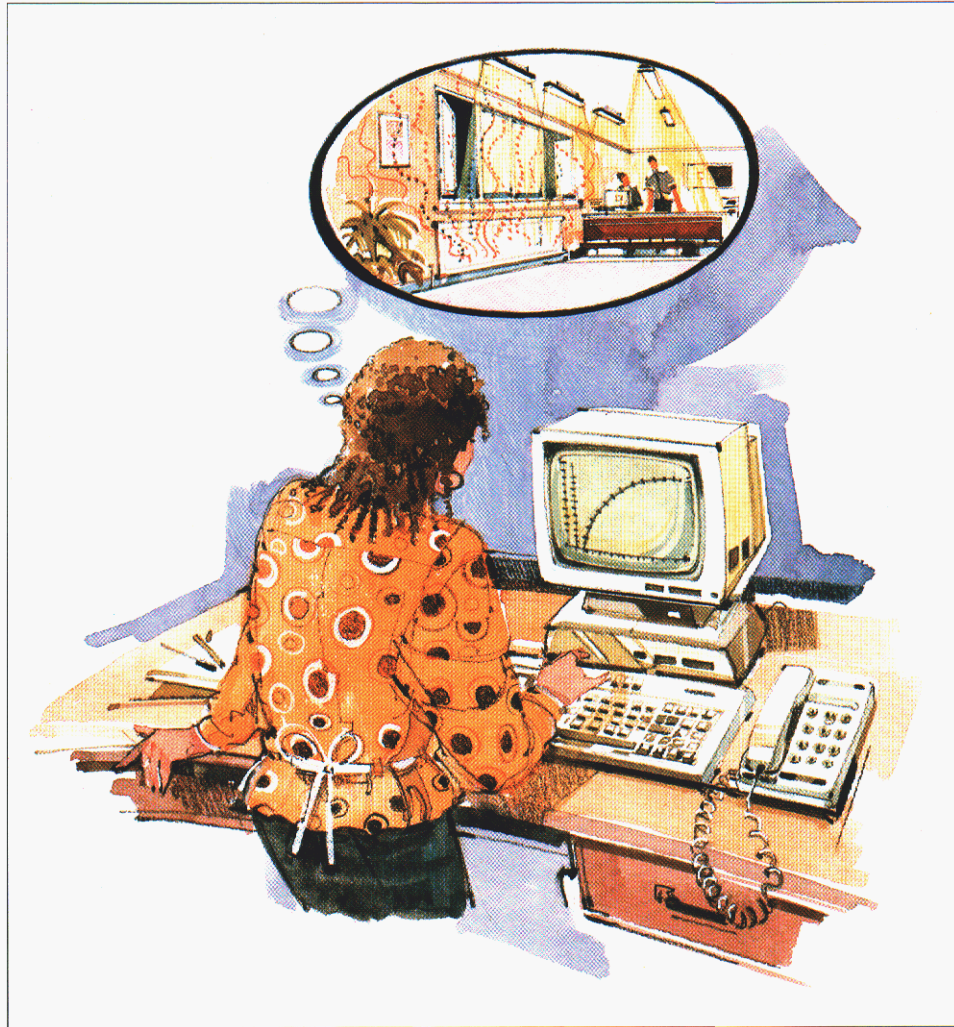
#### EXPLOITING OPPORTUNITIES

New buildings, refurbishment projects, plant replacement and equipment purchase all represent significant opportunities for introducing long-term energy saving measures at only marginal cost. Can you establish a formal mechanism for identifying such opportunities so that you can propose energy efficiency options? Try to foster a management approach which considers the most energy efficient option on the basis of its life-cycle cost advantage.

#### MANAGEMENT INFORMATION

The most common reason for failure of financial appraisal is not giving a true financial picture of a project, either because the benefits are overstated or the costs understated. Costs for energy saving projects in buildings are usually easier to establish than savings.

A good energy monitoring system will make it easier to predict the effect of a proposed project on energy use and cost.



**You can find out a great deal about energy use, and the kinds of measures that can be applied from even the most basic information**



**It is important for energy management to be supported by an adequate information system to evaluate investment opportunities properly**



**Payback is simple to calculate**

## CAPITAL RETURN BUDGET

### CAPITAL RETURN BUDGET

The Capital Return Budget sets the savings against the capital costs and monitors the size of the accrued fund.

	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
<b>EXPENDITURE</b>	<b>actual</b>	<b>actual</b>	<b>actual</b>	<b>actual</b>	<b>estimated</b>	<b>plan</b>
Housekeeping	6000					
Modify pipework		800				
Modify air-conditioning		9000				
Extend heating system		800				
BEMS			44000			
Separate hot water heating			7800			
Insulate oil storage tanks			6000			
Replace burners			9000			
Insulate roof			4000			
Boiler replacement				2000		
Replace timeclocks				1200	1200	
Replace blinds				2500		
Low energy lamps				3500	3500	
Combined heat and power					65000	
<b>SAVINGS</b>	<b>actual</b>	<b>actual</b>	<b>actual</b>	<b>actual</b>	<b>estimated</b>	<b>plan</b>
Housekeeping	12000	25000	25000	25000	25000	25000
Modify pipework		4000	4000	4000	4000	4000
Modify air-conditioning		22500	22500	22500	22500	22500
Extend heating system		1600	1600	1600	1600	1600
BEMS			21429	21429	21429	21429
Separate hot water heating			6500	6500	6500	6500
Insulate oil storage tanks			5454	5454	5454	5454
Replace burners			5294	5294	5294	5294
Insulate roof			1600	1600	1600	1600
Boiler replacement				833	833	833
Replace timeclocks				667	1333	1333
Replace blinds				833	833	833
Low energy lamps				2188	4375	4375
Combined heat and power					13000	13000
<b>TOTALS</b>	<b>actual</b>	<b>actual</b>	<b>actual</b>	<b>actual</b>	<b>estimated</b>	<b>plan</b>
Expenditure	6000	10600	70800	9200	69700	0
Savings	12000	53100	93377	97898	113751	113751
Savings - Expenditure	6000	42500	22577	88698	44051	113751
Savings - Expenditure (Cumulative)	6000	48500	71077	159775	203826	317577

In this case, there is retained revenue in the organisation of £317 577 after 6 years (from only a portion of an estate with annual energy costs of £3 million)