What Are the Best Ways to Finance Your Energy Management Projects?

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Editor's Note: In a recent research project, a panel of financiers and facility managers developed a "top-ten" list of objectives that facility managers should consider when they plan the financial arrangements for an energy management project. The top-ten list includes economic and strategic objectives.

Surprisingly, having a high economic benefit was not the main concern of the facility managers. They were at least equally concerned with having positive cash flow projects, reducing risk and minimizing the impact on in-house resources.

This article describes a generalized "decision tree" which was developed to guide facility managers to the best financial arrangements.

BACKGROUND ON FINANCING ENERGY MANAGEMENT PROJECTS

Most facility managers would agree that energy management projects (EMPs) are good investments. Generally, EMPs reduce operational costs, have a low risk/reward ratio, usually improve productivity and even have been shown to improve a firm's stock price.[1] Despite these benefits, many cost-effective EMPs are not implemented due to financial constraints. Often, the facility manager does not have enough cash to allocate funding, or cannot get budget approval to cover initial costs. Finan-

cial arrangements can mitigate a facility's funding constraints.

A previous article in Energy Engineering *explains some of the differences between the basic financial arrangements.*[2] *For readers who are unfamiliar with financial arrangements, it is recommended that you read this article.*

Numerous papers and government programs have been developed to show facility managers how to use quantitative (economic) analysis to evaluate financial arrangements.[3,4,5] *Quantitative analysis includes computing the simple payback, net present value (NPV), internal rate of return (IRR), or life-cycle cost of a project with or without financing.* Although these books and programs show how to evaluate the economic aspects of projects, they do not incorporate qualitative factors like strategic company objectives, (which can impact the financial arrangement selection). Without incorporating a facility manager's qualitative objectives, it is hard to select an arrangement that meets all of the facility's needs. The following section lists some characteristics that can impact the selection of financial arrangements.

WHICH FINANCIAL ARRANGEMENT IS BEST?

There are at least three types of characteristics that can influence which financial arrangement should be used for a particular EMP. These include **facility characteristics, project characteristics** and **financial arrangement characteristics**. In this section, quantitative characteristics are bulleted with this symbol: $. The qualitative characteristics are bulleted with this symbol: ☺. *Note that qualitative characteristics are generally "strategic" and are not associated with an exact dollar value.*

A few of the **Facility Characteristics** include:

☺ The long term plans of facility. For example, is the facility trying to focus on core business objectives and outsourcing other tasks, such as EMPs?

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[1]Wingender, J. and Woodroof, E., (1997) "When Firms Publicize Energy Management Projects Their Stock Prices Go Up: How High?—As Much as 21.33% within 150 Days of An Announcement," *Strategic Planning for Energy and the Environment*, Vol. 17(1), PP. 38-51.

[2]Woodroof, E. and Turner, W. (1998), "Financial Arrangements for Energy Management Projects," *Energy Engineering* 95(3) pp. 23-71.)

[3]Pennsylvania Energy Office, (1987) The Pennsylvania Life Cycle Costing Manual.

[4]United States Environmental Protection Agency (1994). ProjectKalc, Green Lights Program, Washington DC

[5]Tellus Institute, (1996), P2/Finance version 3.0 for Microsoft Excel Version 5, Boston MA.

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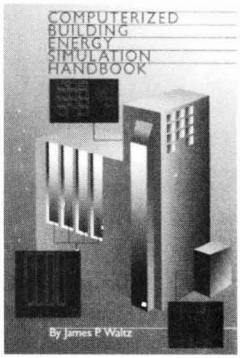

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$ The facility's current financial condition. Credit ratings and ability to obtain loans can determine whether certain financial arrangements are feasible.

☺ The experience and technical capabilities of in-house personnel. Will additional resources (personnel, consultants, technologies, etc.) be needed to successfully implement the project?

☺ The facility's ability to obtain rebates from the government, utilities, or other organizations. For example, there are Dept. of Energy subsidies available for DOE facilities.

$ The facility's ability to obtain tax benefits. For example, government facilities can offer tax-exempt interest rates on bonds.

A few of the **Project Characteristics** include:

$ The project's economic benefits. Net Present Value, Internal Rate of Return and Simple Payback.

☺ The project's complexity and overall risk. For example, a complex project that has never been done before has a different level of risk than a standard lighting retrofit.

☺ The project's alignment with the facility's long-term objectives. Will this project's equipment be needed for long-term goals?

☺ The project's cash flow schedule and the variance between cash flows. For example, there may be significant differences in the acceptability of a project based on when revenues are received.

A few of the **Financial Arrangement Characteristics** include:

$ The economic benefit of a project using a particular financial arrangement. The Net Present Value and Internal Rate of Return can be influenced by the financial arrangement selected.

☺ The impact on the corporate capital structure. For example, will additional debt be required to finance the project? Will additional liabilities appear on the firm's balance sheet and impact the image of the company to investors?

☺ The flexibility of the financial arrangement. For example, can the facility manager alter the contract and payment terms in the event of revenue shortfall or changes in operational hours?

THE RESEARCH PROJECT

This section describes the recent research project to identify and prioritize objectives (and associated characteristics) that a facility manager should consider when selecting a financial arrangement for an EMP. These objectives were used to develop a decision support system (E-FUND) to help the facility manager identify the most appropriate financial arrangement, based on qualitative and quantitative input.

Research Approach

Experts in the field were surveyed to develop a "top-ten" list of objectives (quantitative and qualitative) that a facility manager should consider when selecting a financial arrangement for an EMP. There were two categories of survey participants: a panel of financiers and a group of facility managers.[6] Within the survey populations, the average facility manager had over 15.7 years experience, while the average financial panelist had over 13.6 years experience financing EMPs. Table 1 shows the top ten objectives.

After the top-ten list of objectives was developed, there were essentially two survey processes. First, the panel of financiers determined which financial arrangements best satisfied each of the top-ten objectives.[7] *This was the foundation of the E-FUND model.* In the second survey process, E-FUND was then applied in four case studies, all of which involved discretionary EMPs.[8] The facility manager survey participants prioritized the

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[6]The term "facility manager" is used loosely, because many participants were "owners" who were responsible for their facility's financial performance.

[7]Although there are many different types of financial arrangements, they were generalized into the following seven: "using cash," the "loan," the "bond," the "capital lease," "selling stock," the "true lease" and the "performance contract." *The authors acknowledge that there are practically an infinite number of "hybrid" financial arrangements, which combine useful aspects of each arrangement type.*

[8]To test the responsiveness of the E—FUND model, each case study was designed to favor a particular arrangement. In a simplistic view, the types of financial arrangements can be described as three categories. "Host-managed" arrangements are traditional purchase agreements (loans, bonds, capital leases and using cash), where the host facility purchases the

(Continued)

Table 1. Top-ten List of Objectives

#	CUMULATIVE LIST OF OBJECTIVES	EXPLANATIONS/EXAMPLES
1	To have a high economic. benefit (High Net Present Value, or Short Payback Period)	Facility managers often select projects with a short Payback Period, or projects with a high Net Present Value. *The NPV of each arrangement incorporates all quantitative factors, such as the finance rate assigned by the lender, the timing and amount of the cash flows, as well as the additional costs (administrative, maintenance, legal) required by a certain EMP under a particular arrangement.* Thus, the NPV of each arrangement is the cumulative assessment of all quantitative objectives relating to installing the EMP in a particular facility, using a particular financial arrangement.
2	To reduce the host's risk by using a guaranteed savings performance contract, where the host makes no initial investment, and the project's costs are "paid from savings"	In this case, an Energy Service Company installs and operates the equipment. The ESCO shares the savings with the host, which encourages both parties to maximize savings, and look out for each other. A guaranteed amount of savings (as offered by a performance contract) can reduce the host's risk if the EMP is technically or financially challenging. "Paid from savings" contracts

(Continued)

equipment and manages the project. The second category is the "true lease," which is like a rental agreement. The final category is the "performance contract," which is essentially an outsourcing agreement.

For each case study, the survey participants were provided a description of the project, facility and financial characteristics. Below is a sample of some of the information about each case study, which was provided to the survey participants.

Case A, was designed to favor the "true lease." It was a short-term project, and the host's management did not want to increase liability on the balance sheet.

Case B was designed to favor a "host-managed" arrangement. It was a long-term project, within a facility that had a strong maintenance staff and management wanted to manage the project.

Case C was designed to favor the "performance contract." It was a long-term project within a government facility that had no budget funds available, a weak maintenance staff and management wanted to outsource the project.

Case D was designed to favor a "host-managed arrangement." The project was identical to the Case C project, but the facility had a capable maintenance staff, funds available and management wanted to manage the project internally.

		ings" contracts require no up-front investment, allowing the host to preserve in-house funds for other company purposes.
3	To minimize the impact on the maintenance and energy management teams. or To compliment maintenance goals and improve effectiveness.	Based on the EMP's complexity and the host's in-house expertise, the host's maintenance and energy management teams may need to devote attention that should be focused elsewhere (i.e. implementing other profit improvement measures). However, if the financial arrangement (such as a performance contract) provides maintenance and technical services or improves maintenance effectiveness, the in-house resources can focus their attention on core business goals.
4	To use a comprehensive, "system-wide" approach to maximize the replacement of outdated equipment.	Performance Contracts can be "bundled" to include other services and projects, creating a larger, more comprehensive package. This is the opposite of "cream skimming." For example, a lighting retrofit may be "bundled" with a chiller retrofit to obtain additional "system-wide" benefits.
5	To have an "easy to understand" agreement that minimizes the impact on the host's administrative personnel.	A simple agreement can "stand by itself" (no matter who is interpreting it) and minimize the potential for litigation in the future. Complex contracts may require the host's administrative personnel to devote attention that should be focused on achieving core business goals.
6	To minimize contractual restraints, so the facility manager has greater flexibility and control over the project.	A performance contract can require the host to operate a minimum number of hours per year, thereby restricting the host's ability to change operations and react to unforeseen circumstances. In addition, contracts may restrict the facility manager's ability to specify equipment, use specific vendors or obtain other preferences.
7	To protect the host's financial image by using off-balance sheet financing and	If available, "off-balance sheet" financing, as with a True Lease (a rental agreement), allows the host to use the equipment without

	avoid using collateral that could be spared to support future financing.	purchasing it. This keeps project liabilities off the balance sheet, allowing the host to retain a stronger financial image. Minimizing the amount of collateral (on Uniform Commercial Code filings) improves the host's ability to obtain future financing.
8	To structure an arrangement such that annual savings are always greater than annual payments. Thus, the project only has positive cash flows.	If the maximum payment is set equal to the minimum savings estimate, the project should have only positive cash flows (provided the equipment will last long enough to pay itself off). In the event of unforeseen or periodic project expenses, an agreement with adjustable payments can be used to eliminate annual profit shortfalls. In such a case, the agreement could be changed so the host makes smaller payments for a longer time period.
9	To secure fixed interest rate financing for the length of the project.	If possible, securing fixed interest rate financing would reduce risk relating to interest rate fluctuation. This can be helpful when financing the construction and operational phases of the project.
10	To be able to easily expand the scope of the arrangement.	Certain arrangements permit either party to suggest improvements that can be added easily to the scope of work. Also in certain financial arrangements, it is easy to acquire additional financing with minimal paperwork.

top-ten objectives within each case study's unique characteristics.

Using a well-respected and sophisticated weighting system, (that combined the responses from both survey participant groups) E-FUND scored the ability of each financial arrangement to satisfy the facility's needs.[9] The scores were normalized and indicated in percents. Thus, the higher the percent, the better a financial arrangement scored in satisfying the facility manager's needs.

[9]The Analytic Hierarchy Process, developed in the 1970s by Dr. Thomas Saaty is one of the most well referenced decision-making systems in the field.

Results

Figure 1 shows E-FUND's selection for each case study. The results indicate that the "performance contract" and the "true lease" received higher than average scores in most of the case studies.

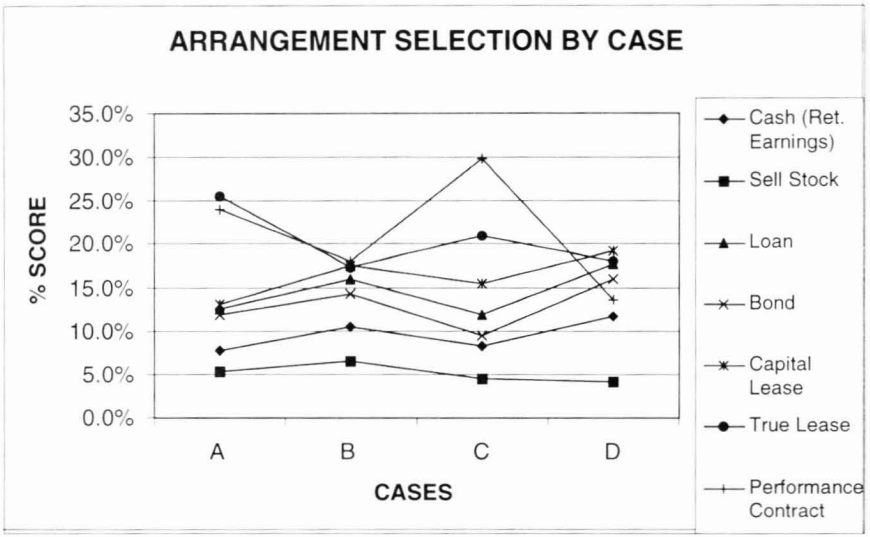

Figure 1. Arrangement Selection by Case Study.

Discussion

As evident from Figure 1, certain financial arrangements were not selected in any of the cases. E-FUND did not select "selling stock" in any of the case studies. This result is likely because all panelists and facility managers were unfamiliar and probably uncomfortable using that type of arrangement. In addition, none of the top-ten objectives were directly related to selling stock. Despite these results, selling stock could still be beneficial for companies that can manage a project internally and can increase firm value by revising their capital structure.

The "using cash" arrangement was also not selected in any of the case studies because as a prerequisite for the E-FUND model, the projects needed to be large enough to require financing.

Because E-FUND's results varied based on each case study's characteristics, it is important to understand the facility manager's needs in every project. (You may need to adjust E-FUND's top-ten objectives to correlate with your facility's needs).

Research Conclusion

These results indicate that the "true lease" and the "performance contract" have the ability to satisfy more of the top-ten objectives than the other financial arrangements. Another interesting observation was made from the survey responses of the participants. Surprisingly, both participant groups did not score objective #1 (the importance of having a high economic benefit) as the primary need for facility managers. During the facility manager survey, only 17.5% of the time did a facility manager score objective #1 more important than any other objective.

In addition, when objective #1 was scored higher, most facility managers did not indicate that it was overwhelmingly higher. The facility managers were at least equally concerned with: having positive cash flow projects, reducing risk, off-balance sheet financing and minimizing the impact on in-house resources. These findings contradict traditional engineering economic theory, that having a high economic benefit is by far the most important objective. Although the exact reason for the participants' judgments is unknown, a few possible theories are presented below. *Note: these theories are not mutually exclusive.*

THEORY #1

If these judgments are accurate and truly represent the beliefs of facility managers, then perhaps economic benefits are not as important as other *more strategic* objectives. This would be a startling fact if proven true. *Additional research could involve a larger pool of facility managers. Their responses could be stratified by participant title (CFOs, facility managers, presidents, etc.) to determine if different title groups have different opinions about the importance of objectives. It would also be interesting to determine the response variance based on facility type (government, private, etc.).*

THEORY #2

Alternatively, it could be that EMPs are not seen as typical profit-enhancing investments, which are evaluated based on their NPV, return on investment or simple payback period. Perhaps the facility manager's perspective is that EMPs are necessary projects (like overhead expenses) that should be implemented with minimal effort, investment and distraction

from a company's core business goals.[10] If facility managers desire to reduce investment and attention towards EMPs, the "true lease" and "performance contract" may best satisfy the facility manager's needs because these arrangements usually offer maintenance agreements and/or minimal investment and/or project management.

In essence, the "true lease" and "performance contract" embody the basic elements of outsourcing or sub-contracting, which appear to be most attractive to facility managers at this time. These findings could indicate an industry mega-trend to outsource any non-core-related business function.

INCORPORATING STRATEGIC ISSUES INTO THE FINANCIAL ARRANGEMENT SELECTION PROCESS

Because strategic issues can be important when selecting financial arrangements, the facility manager should include them in the selection process. The following questions can help assess a facility manager's needs.

- Does the facility manager want to manage projects or outsource?
- Are net positive cash flows required?
- Will the equipment be needed for long-term needs?
- Is the facility government or private?
- If private, does the facility manager want the project's assets on or off the balance sheet?
- Will operations be changing?

From the research experience, a Strategic Issues Financing Decision Tree was developed to guide facility managers to the financial arrangement which is most likely optimal. Figure 2 illustrates the decision tree, *which is by no means a rule,* but it embodies some general observations from the research.

Working the tree from the top to bottom, the facility manager should assess the project and facility characteristics to decide whether it is strategic to manage the project or outsource.

If outsourced, the "performance contract" would be the logical

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[10]This is interesting since recent research has shown that stockholders consider EMPs as profit-enhancing projects, and after such projects are announced, a host facility's stock price can increase abnormally [See Footnote #1: Wingender and Woodroof, 1997]. Thus, additional research could provide greater insight on how EMPs are perceived, either as profit-enhancing projects or as overhead expenses, (or other perspectives).

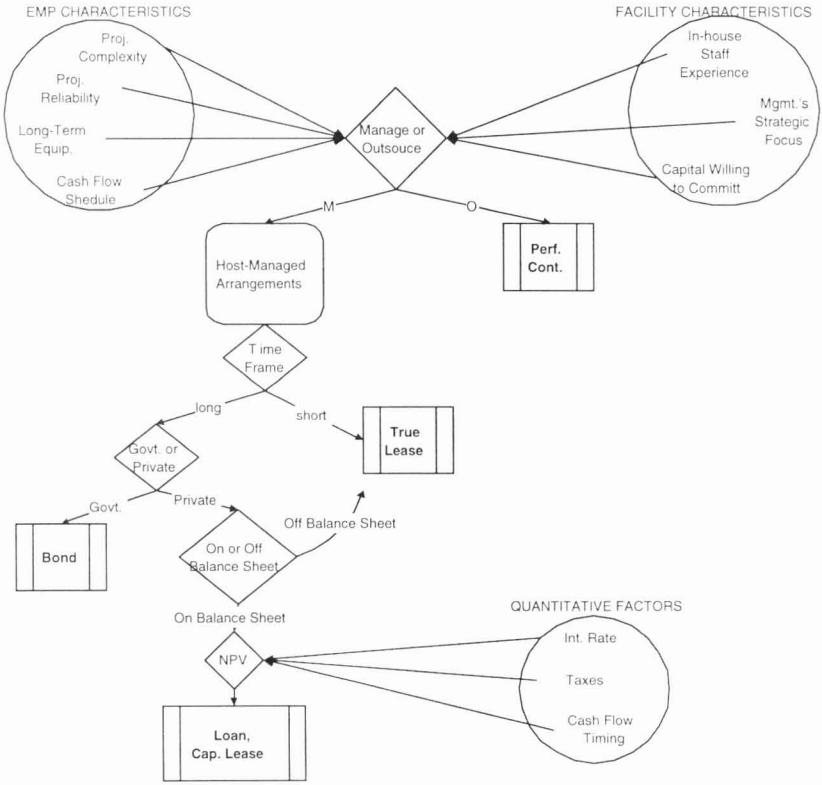

Figure 2. Strategic Issues Financing Decision Tree.

choice.[11] If the facility manager wants to manage the project, the next step (moving down the tree) is to evaluate whether the project's equipment will be needed for long or short-term purposes.

If short-term, the "true lease" is logical. If it is a long-term project, in a government facility, the "bond" is likely to be the best option.

If the facility is in the private sector, the facility manager should decide whether the project should be on or off the balance sheet. An off-balance sheet preference would lead back to the "true lease."

If the facility manager wants the project's assets on the balance sheet, the Net Present Value (or other economic benefit indicator) can help determine which "host-managed" arrangement (loan, capital lease or cash) would be most lucrative.

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[11] It should be noted that a performance contract could be structured using leases and bonds.

CONCLUSION

This research identified some key issues to evaluate when selecting a financial arrangement for an EMP. As indicated in the research conclusion section, it was surprising that strategic objectives were at least as important as economic objectives. Thus, it is clear that knowing the strategic needs of the facility manager is critical to selecting the best arrangement. From the case studies in this research, the "true lease" and "performance contract" best satisfied the facility manager's needs. These findings could indicate an industry mega-trend to outsource any non-core-related business function.

ABOUT THE AUTHORS

Eric A. Woodroof, Ph.D., has published research papers in numerous international journals and conference proceedings on energy/facility management. His research topics have ranged from lighting maintenance to financing projects. In 1997, Dr. Woodroof showed that when firms publicize their energy management projects, their stock price goes up 21% (on average) above market conditions. In 1998, he was appointed to serve on the editorial board for the international journal *Energy Engineering*. In 1999, Woodroof was appointed to the Certified Energy Managers Board for the Association of Energy Engineers.

Dr. Woodroof is a Certified Energy Manager, Certified Lighting Efficiency Professional, Certified Energy Procurement Professional as well as a Green Lights Surveyor. Formerly the project coordinator for the Industrial Assessment Center at Oklahoma State University (OSU), Woodroof has worked with over 120 companies on energy/facility management projects, with savings worth millions of dollars.

Dr. Woodroof was recently hired by Johnson Controls, Inc. to manage the industrial accounts in Oklahoma. He sees his new job as a "privilege" to help manufacturers gain a competitive advantage by identifying and implementing profit improvement opportunities.

Wayne C. Turner, Ph.D., is a regents professor at Oklahoma State University and former director of the Industrial Assessment Center at OSU. He is a past president of AEE and is in AEE's Energy Manager's Hall of Fame. Wayne is the editor of the *Energy Management Handbook* and the journal *Energy Engineering*. He is author of well over 100 professional articles and has taught CEM certification courses for AEE for about 15 years. He is an avid outdoorsman and has been married to Kathy Turner for 30 years.

Acknowledgments:

The authors would like to thank the research committee at Oklahoma State University, who helped design the methodology and made some outstanding contributions to the project.

Regents Professor Wayne C. Turner,
School of Industrial Engineering and Management
Associate Professor David B. Pratt,
School of Industrial Engineering and Management
Assistant Professor Camille DeYong,
School of Industrial Engineering and Management
Associate Professor Ronald K. Miller, Department of Finance
Professor Eric Neil Angevine, PE, School of Architecture

Via surveys with facility managers and financial experts, the authors learned a lot about financing EMPs. The authors thank the survey participants (some of whom are listed below), who contributed their time to this research project.

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