PN-AAW-931

ISN=49797

FINANCING ENERGY CONSERVATION IN DEVELOPING COUNTRIES

Prepared for:

U.S. Agency for International Development
Bureau for Science and Technology
Office of Bureau
Washington, D.C.

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February 1987

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EXECUTIVE SUMMARY

Energy conservation is a cheap, quick, and relatively painless way for most developing countries to slash energy costs, stretch energy supplies, and save foreign exchange. By producing more output with the same energy input, energy conservation promotes economic efficiency and improves the productivity and competitiveness of energy-consuming enterprises. Energy conservation has also proven to be an effective vehicle for private-sector development.

Despite the significant benefits of energy conservation, the private sector in AID-assisted countries has captured only a fraction of the energy conservation potential. This "inertia" is the result of numerous technical, economic, financial, and institutional barriers which affect the private sector's ability and willingness to undertake conservation investments. The difficulty in financing energy conservation projects is one of the most serious obstacles to greater private sector investment in energy conservation.

To a large degree, the difficulty of financing conservation projects results from several factors related to the nature of conservation investments themselves and the business environment in which investment decisions are made. These factors include:

- Lack of visibility of conservation projects and their benefits
- Lack of a clear cash flow stream
- Lack of asset security
- Private return less than social return
- Competition from other investments
- Lack of priority for energy-related investments
- Foreign currency content
- Uncertain project performance
- Technical sophistication and lack of experience with conservation technologies.

One of the four components of the U.S. Agency for International Development's (AID) long-term development strategy is to promote private-sector development in AID-assisted countries. To this end, a primary goal of AID's Office of Energy (S&T/EY) is to accelerate private-sector participation in all energy activities. As part of this initiative, Hagler, Bailly & Company, the prime contractor for the Energy Conservation Services Program (ECSP), has prepared this report on traditional and innovative approaches to financing energy conservation, and government roles and policy measures to encourage private sector financing of energy conservation investments. By providing practical information on the various energy

conservation financing options that are available, this report will help private investors in AID-assisted countries identify sources of finance for energy conservation investments and assist AID missions to design and implement successful private-sector conservation projects and programs.

PRIVATE SECTOR EVALUATION OF CONSERVATION PROJECTS

The general method by which a private enterprise evaluates an energy conservation project is called **project financial analysis**, which is conducted in three steps:

1. Assembling information on all of a project's cost and revenue flows for the life of the project
2. Computing the after-tax net cash flow for each analysis period
3. Calculating several measures from the cash flow profile that indicate the expected financial performance of the project and its effect on the financial well-being of the investing firm.

The financial measures that the firm may calculate as the basis for deciding whether or not to undertake a project include:

- Present value of after-tax cash flow
- Internal rate of return
- Simple payback period, and
- Occurrence of operating periods with negative cash flow

The project sponsor should generally prefer projects that have the highest internal rate of return or, for a given investment amount, the highest net present value. These projects will yield the highest expected increase in the net worth of the project developer.

TRADITIONAL APPROACHES TO FINANCING ENERGY CONSERVATION PROJECTS

Once a firm has decided to undertake a conservation project, management must decide how to finance it. The two "traditional" approaches to financing industrial investments -- corporate financing and project financing -- can also be used for financing conservation projects.

Corporate financing is the most commoly used approach and is distinguished from project financing by its reliance on the corporate assets of the firm as the security for the financing. The capital is acquired on the basis of the firm's overall financial condition. The funds obtained by corporate financing

may be classified as equity or debt. Traditional equity and debt financing each have their own advantages and disadvantages for use in acquiring funds. Because energy conservation is not usually the focus of a firm's business activities, management will often decide that corporate financial resources should not be allocated to conservation investments.

Project financing may offer an attractive alternative for obtaining funds. It involves securing debt financing on the basis of the asset value and expected cash flow stream of the project itself. However, creditors may be reluctant to provide project-secured financing for conservation projects and they often try to blend the principles of project and corporate financing as they negotiate loans for conservation projects.

GOVERNMENT POLICIES TO PROMOTE PRIVATE INVESTMENT

Because of differences between the public and private approaches to project evaluation and the problems that may confront management in its attempts to finance projects thourgh traditional channels, energy conservation projects often require carefully designed policies and incentives to make them more financially attractive to the private sector. Incentives that have been used by governments to promote private investment in energy conservation include:

- Grants/cost-sharing for technology demonstration
- Grants/no-risk loans for audits and preliminary engineering studies
- Subsidized-interest loans
- Revolving credit funds
- Tax-related incentives
- Purchase of energy savings
- Reducing or eliminating tariffs
- Loan guarantees
- Insurance programs for project technical performance

Implementing a financial assistance program to promote the flow of capital into energy efficiency investments will often require the use of a package of incentives. The choice of incentives will depend on the specific set of factors that are limiting the willingness and ability of companies to finance energy conservation projects and the financial/institutional setting in theh country.

INNOVATIVE APPROACHES TO FINANCING ENERGY CONSERVATION PROJECTS

The limited ability and reluctance of energy users to acquire and deploy capital for energy conservation investments is often the result of the financial

condition of the user. In other cases, however, firms able to raise the capital have remained reluctant to do so. The reasons for this reluctance include:

- Competition for available capital between energy conservation opportunities and investments to maintain or expand market share and production output
- Aversion by borrowers to assuming the fixed-repayment obligations associated with a traditional loan
- Concern for the uncertainty of technical performance and the level of economic return that may be achieved by an energy conservation investment
- Lack of tax-related incentives needed to achieve an adequate return on a conservation investment
- High front-end costs of evaluating the technical and economic feasibility of energy conservation investments.

When confronted with these types of barriers to mobilizing capital for conservation investments, financiers and entrepreneurs in industrialized countries have implemented several innovative arrangements for financing energy conservation. These arrangements, which may help LDCs encourage the flow of capital to private enterprises that possess energy conservation opportunities, include:

- Shared-savings arrangement: An energy user is paired with an external investor who is willing to finance the project. In return for providing financing, the investor receives a share of the value of the energy savings and the tax-related benefits of owning the investment.
- Joint-venture arrangement between an energy user and an external investor: This is a variation of the shared-savings arrangement, but in this case the investor and energy/user have more flexibility in tailoring the arrangement to fit their specific risk/return objectives.
- Energy service agreement: This is similar to a shared-savings arrangement, but the manner in which the energy service firm/external investor receives its financial return differs.
- Variable-payment loan: External funds are provided through debt rather than equity-oriented financing, and the energy user owns the

conservation improvement. Loan payments are set to vary with the value of energy savings.

- Limited-term, guaranteed-payback loan: This is similar to the variable-payment loan, but in this case the creditor shares directly in the risk of the project's technical and economic performance.

- True lease: The tax benefits of project ownership are transferred to an external investor and the energy user makes no front-end cash outlay.

In general, each of these six arrangements is designed to achieve one or more of the following benefits:

- Reduce the front-end cash outlay needed to undertake a project

- Shift uncertain technical or economic risks form the energy user to an external investor or creditor

- Relieve the fixed-payment burden that is associated with traditional debt financing

- Relieve firms from needing to use their corporate balance sheets to secure externally-provided financing

- Transfer tax benefits to an external equity investor who may value such benefits more highly than the energy user.

In return for receiving these benefits, the energy user usually must relinquish some of the potential return that might have been gained if the energy user had financed the project independently. This exchange may be acceptable if the energy user's only alternative is not to undertake the project. Although some of the potential return is relinquished, the energy user can still receive significant benefits by using one of the innovative arrangements.

Using these innovative financing arrangements requires financial institutions able to evaluate the technical and economic risks associated with energy-related investments. In addition, the institutions must be willing to assume certain risks associated with these financing arrangements. In return for accepting these risks, creditors can expect higher returns than might be obtained from offering conventional loans to finance energy-related investments. Governments can play various roles in promoting the development of the needed financial infrastructure and the use of these innovative financing arrangements, including:

- Forming a publicly-chartered finance corporation that would be authorized to engage in any of the innovative financing activities.

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The corporation would be initiated with public capital, but after a start-up period, the corporation would be able to gain access to private capital and perhaps become independent of government support.

- Sponsoring demonstrations of innovative financing arrangements. These demonstrations would be conducted jointly by a public agency and a private organization. The public agency would provide technical assistance and might also guarantee the return of capital for the projects or provide other incentives.

- Providing training and certification programs in energy auditing. The government would also instruct financing organizations on how to interpret audit results as a basis for evaluating conservation investment opportunities.

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INTRODUCTION

Energy conservation is a cheap, quick, and relatively painless way for most developing countries to slash energy costs, stretch energy supplies, and save foreign exchange. By producing more output with the same energy input, energy conservation promotes economic efficiency and improves the productivity and competitiveness of energy-consuming enterprises. Energy conservation has also proven to be an effective vehicle for private-sector development.

Energy conservation measures range from simple "housekeeping" measures (e.g., proper operation and maintenance, shutting off unneeded equipment,) which require little or no cost and can be implemented immediately, to more expensive, capital-intensive projects, (e.g., process changes, fuel switching, retrofitting equipment, cogeneration systems) which require significant financial investments and can take several months to implement.

Despite the significant benefits of energy conservation, the private sector in AID-assisted countries has captured only a fraction of the energy conservation potential. This "inertia" is the result of numerous technical, economic, financial, and institutional barriers which affect the private sector's ability and willingness to undertake conservation investments.[1] The difficulty in paying for -- or financing -- energy conservation projects is one of the most serious obstacles to greater private sector investment in energy conservation.

To a large degree, the difficulty of financing conservation projects results from several factors related to the nature of conservation investments themselves and the business environment in which investment decisions are made. Some of these factors limit the willingness of companies to undertake a project, while others restrict their ability to obtain financing, either from internal or external sources. These factors and their effect on conservation project financing include:

- **Lack of visibility of conservation projects and their associated financial benefits.** Conservation projects do not contribute directly to increased revenues and often involve smaller investments than plant expansion or production line additions. Moreover, they are likely to be understood only by plant engineers. For these reasons,

[1] For a detailed discussion of the technical, economic, financial and institutional barriers to private investment in energy conservation in AID-assisted countries, see Accelerating Private Investment in Energy Conservation: Identification and Analysis of Key Barriers and Policy Tools. U.S. Agency for International Development, Bureau for Science and Technology, Office of Energy, February 1987.

conservation investments often do not receive management's attention and, even though they may have good financial returns, are not given priority in the capital budgeting process.

- Lack of a clear cash flow stream. Because conservation projects do not add directly to company revenues, it is often difficult to "see" the cash flow that creates the return on investment and provides for debt repayment. This difficulty in showing the cash flow benefit makes both companies and creditors uncomfortable with financing conservation projects.

- Lack of asset security. Conservation projects often involve installation of customized equipment that would be difficult and expensive to remove and use in another location. As a result, the investments provide little asset security to support external financing.

- Private return less than social return. Because of taxes, differences between social and private discount rates, and differences between the posted and free-market prices of energy products, the private (financial) return on conservation investments is often not as attractive as the public (economic) return. Thus projects that would benefit the country may not be undertaken because they do not offer a high enough return to the private investor. This problem is most important in countries that subsidize domestic energy consumption.

- Competition from other investment opportunities. Energy conservation investments must compete directly with investments to maintain or expand market share and production. The availability of other investment opportunities, especially those that involve the basic business of the enterprise (e.g., production line expansion) and would generate additional revenues, will often cause an enterprise to reject cost-effective conservation investments.

- Lack of priority or concern for energy-related investments. In many enterprises, energy is not an important component of total production cost, and management simply will not give attention to or support for conservation projects.

- Failure to understand the effect of incremental improvements in cash flow and earnings on overall profitability of the enterprise. Conservation projects often involve relatively small investments, generate small profit and cash flow streams, and -- at least in the first order analysis -- generate no additional revenues. However, even a small incremental improvement in cash

flow and profitability can translate into improved financial performance for an enterprise.

- **High foreign currency content.** The outlay for conservation projects often contains a high fraction of equipment and engineering services purchased from abroad. The high foreign exchange requirements can be a major difficulty for developing countries with limited foreign exchange resources.

- **Uncertain project performance.** The level of risk associated with conservation investments is usually difficult to understand and accept because the compounded sources of uncertainty -- uncertainty about the technical performance of the conservation investment, the price of the energy resources that are conserved, and the company's production levels and associated use of the conservation investment. This uncertainty deters companies' interest in undertaking conservation projects and lenders' willingness to finance them.

- **Technical sophistication and lack of experience with conservation technologies.** Conservation projects often involve sophisticated equipment and processes that are outside the experience of company management and creditors. Moreover, even though a conservation technology may have been proven and widely accepted in other countries, it may still be new and unfamiliar in a developing country. The unfamiliarity of conservation technologies makes management and creditors reluctant to support projects that depend on them.

One of the four components of the U.S. Agency for International Development's (AID) long-term development strategy is to promote private-sector development in AID-assisted countries. To this end, a primary goal of AID's Office of Energy (S&T/EY) is to accelerate private-sector participation in all energy activities. As part of this initiative, Hagler, Bailly & Company, the prime contractor for the Energy Conservation Services Program (ECSP), has prepared this report on traditional and innovative approaches to financing energy conservation, and government roles and policy measures to encourage private sector financing of energy conservation investments. By providing practical information on the various energy conservation financing options that are available, this report will help private investors in AID-assisted countries identify sources of finance for energy conservation investments and assist AID missions to design and implement successful private-sector conservation projects and programs.

This report is divided into two chapters:

- Chapter 1 introduces some basic concepts concerning private sector evaluation of energy conservation projects; traditional approaches to financing conservation investments; and incentive measures and assistance programs that the public sector may use to overcome the barriers to financing conservation investments.

- Chapter 2 examines some innovative approaches to financing energy conservation projects that are designed to overcome the barriers to traditional financing techniques. This chapter also discusses government roles for promoting the use of these innovative financing methods.

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CHAPTER 1: PRIVATE INVESTMENT IN ENERGY CONSERVATION: SOME BASIC CONCEPTS

The purpose of this chapter is to introduce some basic concepts concerning private sector evaluation of conservation projects, traditional approaches to financing conservation investments, and government policies to promote private investment in energy conservation. These concepts are reviewed and analyzed in more detail in Annex A.

PRIVATE SECTOR EVALUATION OF CONSERVATION PROJECTS

The general method by which a private enterprise evaluates an energy conservation project is called **project financial analysis**. The project financial analysis is conducted in three steps:

1. Assembling information on all of a project's cost and revenue flows for the life of the project

2. Computing the after-tax net cash flow for each analysis period

3. Calculating several measures from the cash flow profile that indicate the expected financial performance of the project and its effect on the financial well-being of the investing firm.[1]

The financial performance measures that the firm may calculate as the basis for deciding whether or not to undertake the project include:

- Present value of after-tax cash flow: the cumulated value of all project cash flows which have been discounted to the beginning of project development at the firm's target after-tax rate-of-return on equity. This value indicates the expected increase in the firm's (or other developer's) net worth as a result of undertaking the project.

- Internal rate of return: the after-tax return on equity that causes the present value of after-tax cash flow to equal zero. This value is a measure of the project's financial performance per monetary unit of equity invested.

[1] As part of the Energy Conservation Services Program (ECSP), AID's Office of Energy has developed a computer program designed to assist in evaluating the financial and economic performance of energy conservation projects. The Energy Conservation Project Investment Evaluation Model (ECPIE) is available from the Office of Energy.

- Simple payback period: the length of time required for the project's cumulative, undiscounted after-tax cash flows to become positive. At this point, the firm will have recovered its cash investment.

- Occurrence of operating periods with negative cash flow: an indicator of the financial stability/strength of the project.

The prospective project sponsor should generally prefer projects that have the highest internal rate of return or, for a given investment amount, the highest net present value. These projects will yield the highest expected increase in the net worth of the project developer, which should normally be the chief objective of private enterprise. However, the other measures of financial performance may also influence the decisions of the prospective developer. For example, if projects have varying risk profiles, the project developer may willingly accept a project with lower expected return but also lower risk. In addition, the sponsor may prefer projects with a more stable cash flow pattern even though they may have a lower expected return.

TRADITIONAL APPROACHES TO FINANCING ENERGY CONSERVATION PROJECTS

Once a firm has decided to undertake a conservation project, management must decide how to pay for -- or finance -- the project. The two "traditional" approaches to financing industrial investments -- corporate financing and project financing -- can also be used for financing conservation projects. However, the unique characteristics of conservation investments and management's attitude toward them often limit the application of these traditional financing techniques. Both approaches are described below.

Corporate Financing of Energy Conservation Projects

Corporate financing is the most commonly used approach to acquiring the funds for an industrial investment and is distinguished from project financing by its reliance on the corporate assets of the firm as the security for the financing. The capital is acquired on the basis of the firm's overall financial condition, which will reflect the level of its assets and liabilities, the outlook for profitability, the extent to which liabilities must be paid soon, and the amount of assets that could quickly be converted to cash to meet unforeseen business expenses or revenue shortfalls.

The funds obtained by corporate financing may be classified as equity or debt. In deciding whether and how to use these financial resources for a conservation project, management must consider the cost of the funds and the

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extent to which using the corporate financial resources may impair the firm's ability to acquire additional capital funds for other projects.

Equity financing represents ownership of the assets of a corporation; the equity holders of a corporation are not guaranteed a repayment stream and receive a return on their investment only if the corporation can meet all other financial obligations and still have something left over for the equity holders. Debt financing represents a contract by the corporation to repay the providers of debt capital both the loan principal and a fixed return (interest) for the use of the funds. Unlike the providers of equity financing, providers of debt retain specific rights to the assets of the corporation as security for the lent funds.

Traditional equity and debt financing each have their own advantages and disadvantages for use in acquiring funds for conservation projects:

- Equity financing is generally more expensive than debt financing because of the higher risk accepted by the equity owners of the firm. However, debt financing may expose the corporation and its equity holders to greater uncertainty of financial performance and risk of bankruptcy.

- The use of either form of financing may reduce management's prerogatives in managing the firm's business. Debt agreements often contain restrictive covenants that may limit subsequent financing activities and issuing new equity may dilute the ownership prerogatives of existing equity holders. Management may be unwilling to accept these costs to finance conservation projects, which are generally not the central focus of the firm's business activities.

- Using either form of financing may limit the firm's future financing capabilities. A firm's financing ability is determined by the existing debt/equity structure, the outlook for financial performance, and the liquidity of the firm's assets. When the firm uses some of this financial resource for a conservation project, it reduces its ability to use that resource in the future or at least increases the cost of its use. Again, management may be reluctant to use this resource to finance conservation investments.

Management must decide whether the benefits from conservation projects exceed the costs of using the firm's limited corporate financial resources, and whether to use the financial resources for energy conservation projects or to direct them to some other use. Because energy conservation is not usually the focus of a firm's business activities, management will often decide that corporate financial resources should not be allocated to conservation investments.

Project Financing of Energy Conservation Projects

Because management is often reluctant to use its corporate financial resources for conservation projects, project financing may offer an attractive alternative for obtaining capital funds. Like corporate financing, project financing generally consists of a combination of equity and debt. However, in contrast to corporate financing, project financing involves securing debt financing not on the basis of the firm's asset structure and business activity, but on the asset value and expected cash flow stream of the project itself.

Project financing has certain advantages over corporate financing. The project debt will usually not be recorded as a liability on the corporate balance sheet. Thus, the firm's corporate financing ability should not be impaired by the financing of the conservation project. In addition, more of the debt repayment risk is generally shifted to the lender than would be the case if the debt were secured by the general corporate assets. In the event that the borrower defaults on project-secured debt, the creditor's recourse is limited to the assets of the project (or any other security pledged for the loan) instead of general corporate assets.

However, there are also disadvantages to project financing. The cost of a project financing loan, both as interest and origination expense, is usually higher than for conventional corporate financing loans. The higher cost is due to the typically greater default risk absorbed by the creditor and the more detailed project evaluation required to verify the adequacy of project cash flow to cover debt payments. Despite these higher costs, management will often prefer to use the project financing approach for conservation investments.

Although project financing offers an attractive source of funds for conservation projects, creditors may be reluctant to provide project-secured financing for conservation projects, for several reasons:

- Conservation projects may not provide the level of asset security desired by creditors for limited recourse lending
- It is difficult to isolate a revenue stream that can be used for repaying the project debt
- Creditors are likely to be unfamiliar with the technological and economic performance factors involved in assessing the expected performance of a conservation project.

As a result of these problems, creditors often try to blend the principles of project and corporate financing as they negotiate loans for conservation projects. Creditors may require that a conservation project developer pledge some additional asset as security for a loan. In this way, management may

still be able to realize some of the benefits of a project financing: the creditors' recourse will be limited and, in some circumstances, the liability may be kept off the balance sheet. But, of course, management will lose the flexibility of using the pledged asset as security for any other financing.

GOVERNMENT POLICIES TO PROMOTE PRIVATE INVESTMENT

Because of differences between the public (economic) and private (financial) approaches to project evaluation,[2] and the problems that may confront management in its attempts to finance projects through traditional channels, energy conservation projects often require carefully designed policies and incentives to make them more financially attractive to the private sector. Incentives that have been used by governments to promote private investment in energy conservation include:

- Grants/cost-sharing for technology demonstration
- Grants/no-risk loans for audits and preliminary engineering studies
- Subsidized-interest loans
- Revolving credit funds
- Tax-related incentives
- Purchase of energy savings
- Reducing or eliminating tariffs
- Loan guarantees
- Insurance programs for project technical performance

Grants/Cost-Sharing for Technology Demonstration

Technology demonstration is often perceived as risky in a developing country even though a conservation technology may have been successfully applied and widely accepted in other countries. For this reason, it is often necessary for the government to pay all or a substantial share of the cost of installing a conservation technology for the first-time application in a country. The typical share of a project's cost that might be borne by the government could range from 25 to 80 percent, depending on the degree of risk of the project. In developing countries, the grant will often be specifically for the foreign exchange component of the project. Demonstration grants are currently offered in the Philippines (Exhibit 1).

[2] See Annex A.

Exhibit 1

Examples of Countries that have Used Financial Incentives for Conservation Projects

Countries	Incentives								
Developed countries	Demonstration grants	Grants/no-risk loans for audits	Low interest loans	Revolving credit funds	Tax-related incentives	Purchase energy savings	Tariff exemption	Loan guarantees	Performance insurance
France	X	X	X		X	X			
Germany	X	X	X		X	X			
Japan	X	X	X		X	X	X		
Sweden	X	X	X	X					
United States	X	X			X	X	X	X	X
United Kingdom	X	X					X		
Developing countries									
Brazil			X						
Costa Rica		X							
Dominican Republic		X	X	X					
India			X		X		X		
Jamaica				X					
Korea		X							
Panama		X							
Philippines	X	X	X		X	X	X		
Sri Lanka		X							
Thailand		X	X				X		

Grants/No-Risk Loans for Audits and Preliminary Engineering Studies

Experience indicates that grants are most effective at the early stages of an energy conservation project, when there is the most risk and uncertainty. Although the outlay for audits and preliminary engineering studies is generally the least expensive part of an energy conservation project, it is at this point that the least is known about the potential benefits of the project. As a result, private investors are often reluctant to make even a relatively small cash outlay. To overcome this aversion to risk, several governments have provided grants or no-risk loans for audits and preliminary engineering work. The no-risk feature of a loan means that the company is obligated to repay the loan only if the audit/engineering studies identify conservation opportunities that meet specified financial criteria. These loans are most effective when they are interest-free or at below-market rates. Grants and no-risk loans for audit/engineering studies have been used in several developing countries, including Costa Rica, Dominican Republic, Korea, Panama, Philippines, Sri Lanka, and Thailand (Exhibit 1).

Subsidized-Interest Loans

Subsidized-interest loans enable energy users to obtain credit for energy efficiency improvements at a lower cost-of-capital than would be obtained if they borrowed from financial institutions at market rates. As a result, the expected financial performance of projects should be improved and energy users should be more willing to undertake them. In addition, government's intervention in the lending process draws attention to the need for energy project funding and may increase the willingness of financial institutions to lend for energy efficiency improvements. Subsidized-loan programs have been used in several developing countries, including the Dominican Republic, India, Philippines, and Thailand (Exhibit 1).

Revolving Credit Funds

The principal objective of revolving credit funds is to provide a protected reserve for energy conservation project financing that cannot be appropriated for other purposes. Funds are lent for qualified projects either directly by the government or through existing financial institutions. As loans are repaid or as additional funds become available through accruals to the fund, additional loans can be made. A few developing countries have implemented revolving credit funds, including Jamaica and the Dominican Republic (Exhibit 1).

Tax-Related Incentives

The use of tax-related incentives, including investment tax credits, accelerated depreciation of conservation investments, and tax holidays, is another way to make energy conservation investments more financially attractive to the private sector. These incentives reduce the taxes that would otherwise have to be paid by an energy user that has installed an energy efficiency improvement. As a result, the implicit capital cost of conservation projects is reduced and the expected return will be higher. Tax incentives function as part of the tax code of a country and thus will only be effective if the tax code itself is enforced and complied with. The Philippines and India are both experimenting with tax-related incentives (Exhibit 1).

Purchase of Energy Savings

The purchase of energy savings is usually a grant or cost-sharing arrangement in which the amount of subsidy is based on the expected value of energy savings from a project. The government agrees to pay a specified value per unit of energy that is expected to be saved over the operating life of a project. In computing the total amount to be paid as subsidy, the government will usually discount the value of savings over time. In addition, the government may limit the subsidy amount to a maximum percentage of the capital cost of an energy efficiency improvement. The value paid per unit of energy saved should be based on the estimated differential between the social and private values of energy consumption/conservation. This incentive has been used effectively in the United States to promote investment in projects to save electricity.

Reducing or Eliminating Tariffs

Another way to increase the financial attractiveness of energy conservation investments is to eliminate or substantially reduce tariffs and import restrictions (including restrictions on private access to foreign exchange) on energy-efficient equipment. Conservation projects in developing countries frequently have high foreign currency content (e.g., as high as 80 percent) because of the need to purchase specialized equipment and engineering services from abroad. Subjecting equipment imports to tariffs can only reduce the expected financial performance of projects and make them less likely to be financed. At the same time, those projects that reduce consumption of an imported fuel reduce the need for foreign currency purchases in the country and will typically have high foreign currency returns. Recognizing that conservation projects will often yield, over the longer term, a national economic benefit from improving the balance of trade, some countries have eliminated duties and tariffs on the import of equipment to be

used in conserving energy. India, Thailand, and the Philippines have reduced or eliminated tariffs and duties for conservation-related imports (Exhibit 1).

Loan Guarantees

Financial institutions in developing countries often perceive energy conservation projects as being risky and uncertain and may therefore be reluctant to make loans for energy efficiency improvements. One way of reducing the perceived risk to private sector creditors is through a loan guarantee program in which the government serves as guarantor on qualifying loans. Qualifying loans will typically be for a fairly high percentage (e.g., 80 percent) of a project's capital cost and the government will typically guarantee a fairly high percentage of the loan (e.g., 80 to 90 percent). There is little developing country experience with energy conservation loan guarantees.

Insurance Programs for Project Technical Performance

Another method for reducing the perceptions of uncertainty/risk is for the government to provide or promote the development of a technical performance insurance program. For a premium, the insurer would guarantee that a project would meet specified efficiency standards with regard to energy conservation. If the project failed to perform to specifications, the insurer would bring the project up to the guaranteed operating specifications or compensate the energy user for the loss in value of energy savings resulting from the sub-specification performance of the project. As a result of such a program, energy users and creditors should have less concern for the technical uncertainties associated with conservation project performance. With this source of risk eliminated, energy users should be more willing to undertake conservation projects and creditors more willing to finance them.

CONSIDERATIONS IN DESIGNING A COMPREHENSIVE FINANCIAL ASSISTANCE PROGRAM

Implementing a financial assistance program to promote the flow of capital into energy efficiency investments will often require use of several incentive mechanisms. The choice of mechanisms will depend on the specific set of factors that are limiting the willingness and ability of companies to finance energy conservation projects and the financial/institutional setting in the country.

With regard to the factors that limit companies' willingness and ability to finance conservation projects, the government should attempt to determine the relative importance of three categories of factors: (1) insufficient flow of

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capital and foreign exchange into conservation investments; (2) lack of adequate financial return to encourage company support; and (3) perception by energy users and creditors of high uncertainty and risk for conservation projects.

If the first category of factors is important -- which is more likely in countries in which the financial sector is not accustomed to dealing with conservation projects -- it may be necessary for the government to implement mechanisms such as: (1) grants/cost-sharing for technology demonstration; (2) grants/no-risk loans for audits and preliminary engineering studies; (3) subsidized interest loans; or (4) revolving credit funds.

The second factor, lack of adequate financial return to encourage company support, is more likely to be important in countries that subsidize energy prices, tax returns on capital heavily, or have high borrowing costs. In this case, the government may need to implement one or more subsidy mechanisms, which include: (1) subsidized interest loans; (2) tax-related incentives; (3) purchase of energy savings; and (4) exemption of conservation-related imports from tariffs.

Finally, if the third category of factors, a perception by energy users and creditors of high uncertainty and risk for conservation projects, is an important deterrent to conservation project financing, the government may need to implement one or more of the following mechanisms: (1) grants/cost-sharing for technology demonstration; (2) grants/no-risk loans for audits and preliminary engineering studies; (3) loan guarantees; and (4) insurance programs for project technical performance.

In practice, it will usually be necessary to implement a package of incentives.

CHAPTER 2: INNOVATIVE APPROACHES TO FINANCING ENERGY CONSERVATION PROJECTS

As discussed in the preceding chapters, the limited ability and reluctance of energy users to acquire and deploy capital are important barriers to undertaking conservation investments in developing countries. These barriers are often based on the financial condition of the consumer. For example, although in recent years industrial firms have had many opportunities to benefit from the use of new, more energy-efficient production technologies, insufficient internal cash, combined with an inability to raise debt or equity capital under favorable terms (e.g., because of a highly debt-burdened balance sheet), have often prevented firms from funding these investments.

In other circumstances, firms able to raise the capital (e.g., by borrowing) needed for energy-related investments remain reluctant to do so. The reasons for this reluctance include:

- Competition for available capital between energy-related investment opportunities and investments required to maintain or expand market share and production output levels
- Aversion by borrowers to assuming the fixed-repayment obligations associated with a traditional loan
- Concern for the uncertainty of technical performance and level of economic return that may be achieved by an energy conservation investment
- Lack of tax-related incentives (e.g., accelerated depreciation and tax credits) needed to achieve an adequate return on an investment in conservation
- Inability of business investors to use available tax-related incentives because of insufficient tax liability[1]
- High front-end costs that may have to be incurred simply to evaluate the technical and economic feasibility of an energy conservation investment.

[1] The relevance of this impediment in LDCs varies from country to country, depending on provisions of the tax code and the extent to which the tax code is effectively enforced.

When confronted with these types of barriers to mobilizing capital for conservation investments, financiers and entrepreneurs in industrialized countries have implemented several innovative arrangements for financing conservation and other energy-related investments. These arrangements, which may help LDCs encourage the flow of capital to private enterprises that possess conservation investment opportunities, include:

- Shared-savings arrangements
- Joint-venture arrangement between an energy user and an external investor
- Energy service agreements
- Variable-payment loan
- Limited-term, guaranteed-payback loans
- True lease.

In general, each of these six arrangements is designed to achieve one or more of the following benefits:

- Reduce the front-end cash outlay needed to undertake a project
- Shift certain technical or economic risks from the energy user to an external investor or creditor
- Relieve the fixed-payment burden that is associated with traditional debt financing
- Relieve firms from needing to use their corporate balance sheets to secure externally-provided financing
- Transfer tax benefits to an external equity investor who may value such benefits more highly than the energy user[2].

In return for receiving these benefits, the energy user usually must relinquish some of the potential return that might have been gained if the energy user had financed the project independently. This exchange may be acceptable if the energy user's only alternative is not to undertake the project. Although some of the potential return must relinquished, the energy user can still receive significant benefits (that otherwise would have been foregone) by using one of the innovative financing arrangements.

In this chapter, we examine the six innovative financing arrangements. For each arrangement, we describe its structure and operation; the distribution of risk between the energy user and the creditors/external investors; and the

[2] The significance of this benefit will vary, depending on a country's tax code and the effectiveness of enforcement and collections.

financial benefits that accrue to the energy user. In addition, we illustrate each financing arrangement with an example that is based on an energy conservation project being considered by a major textile manufacturing facility in Sri Lanka. More specifically, the estimates of investment cost and energy cost savings used in each example are based on retrofitting an existing oil-fired boiler with a wood gasifier. The wood gasifier retrofit was identified as a cost-effective conservation investment opportunity after an intensive analysis of energy consumption and potential process modification, equipment retrofits, and new equipment purchases that could reduce energy requirements.

Following the discussicn of the arrangements, we outline potential roles for the public sector in promoting these innovative financing arrangements in LDCs.

INNOVATIVE APPROACHES TO FINANCING CONSERVATION PROJECTS

Shared-Savings Arrangements

Shared savings is a conservation financing arrangement that pairs an energy user who is unable to finance a conservation investment with an external investor who is willing to finance the project. In return for providing financing, the investor receives a share of the value of the energy savings (or production, if appropriate) and, usually, the tax-related benefits associated with ownership of the investment.

The principal financing benefit of a shared-savings arrangement is that the energy user obtains potentially significant economic benefits through installation of capital improvements for which the user has no financial obligation or liability. The energy user is not required to make any up-front cash outlays, and the downstream payments by the energy user to the shared-savings firm/external investor are contingent upon the technical/economic performance of the conservation improvement (i.e., no performance means no payment). Accordingly, shared-savings financing will generally qualify as off-balance-sheet/off-credit financing and should not impair a user firm's borrowing or equity-raising capability. Indeed, if carefully reviewed by astute creditors and investors, a shared-savings arrangement should enhance the value of a user firm and its terms of access to capital.

Shared savings has gained increasing popularity over the last five years. In the United States, for example, the shared-savings arrangement is offered by more than 100 conservation financing firms. This arrangement has been used to finance a wide variety of energy-related investments, including energy management systems in institutional, commercial, multi-family residential, and industrial applications; process-related modifications in industry; and cogeneration plant installations for industry and institutions.

Arrangement Structure

A shared-savings financing arrangement is typically structured and undertaken as follows. A shared-savings firm first identifies and evaluates the conservation investment opportunities at the energy user's facilities. This evaluation is usually undertaken at no cost to the energy user. However, the energy user will usually be liable for reimbursement of the cost of the detailed engineering and financial evaluation if the shared-savings firm identifies investment opportunities that it is willing to finance but the energy user refuses the firm's financing offer and undertakes the investments on its own.

On the basis of the evaluations by the shared-savings firm and, occasionally, independent evaluations undertaken by the energy user, the shared-savings firm and the energy user negotiate the shared-savings agreement. The agreement includes procedures for establishing the quantity and value of energy savings and a formula for sharing the value of the energy savings. A typical procedure for measuring and valuing energy savings involves projecting the energy user's utility or fuel costs on the basis of his historical energy consumption patterns and current energy prices.[3] Actual energy costs after an improvement has been installed are then subtracted from the projected costs based on historical consumption patterns to arrive at the gross value of energy savings (i.e., the value of energy savings before deducting capital costs or operating expenses). With regard to a sharing formula, a common arrangement is for the shared-savings firm to receive 60 percent of the value of savings for the first 5 years following installation of an improvement, and 40 percent for the second 5 years. At that point, the energy user typically has the option of purchasing the improvement or renewing the contract. In addition to receiving a share of the gross value of savings, the shared-savings firm also usually receives any tax benefits associated with the investment (i.e., tax credits and depreciation).

The energy user retains the value of energy savings not distributed to the shared-savings firm. Since the savings share retained by the energy user is based on gross savings instead of net savings (i.e., the value of energy savings after deducting capital costs and/or operating expenses), the energy user in effect receives a royalty on the value of energy savings produced by the shared-savings firm's investment.

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[3] Establishing the baseline energy consumption data is often one of the more difficult aspects of negotiating a shared-savings agreement since the baseline data are used to estimate total energy savings produced by the conservation improvement. To minimize the potential future disagreements over actual energy savings resulting from the conservation improvement, the energy user and shared-savings firm usually agree on specific adjustments to the baseline data (e.g., to reflect climatic conditions) that will be made in determining energy savings occurring in a specific time period.

The shared-savings agreement also addresses procedures for managing and maintaining the conservation improvement. Since income to the shared-savings firm depends on the performance of the improvement, the shared-savings firm has a strong interest in ensuring that the improvement is maintained and operated efficiently. Accordingly, the shared-savings firm usually accepts (and, indeed, often demands) responsibility for maintaining and managing the improvement. This responsibility is also important in establishing ownership of the improvement for tax purposes. Occasionally, the requirement for a shared-savings firm's involvement in maintaining and managing a conservation improvement reduces the energy user's willingness to accept a shared-savings agreement. This concern is more likely to be important if an improvement involves a modification to a production process.

Once the shared-savings firm and the energy user have negotiated the shared-savings agreement, the shared-savings firm finances and undertakes the conservation improvement. The shared-savings firm may remain the sole owner/investor in the project and finance the improvement from its own financial resources. Or, as an increasingly frequent alternative, the shared-savings firm may syndicate the investment as a limited partnership, with other investors providing the bulk of the investment funds. The typical financial structure of a shared-savings arrangement would be 30 to 40 percent equity leveraged with 60 to 70 percent debt. Occasionally, the debt may be project-secured. However, the debt more generally must become a general obligation of the equity investor(s). After the improvement is completed, the shared-savings firm and the energy user operate under the negotiated agreement, sharing the value of energy savings according to the savings formula.

In a shared-savings financing arrangement, the energy user is able to eliminate all or part of several important risk elements that it would otherwise bear in undertaking a conservation investment. Specifically, the shared-savings firm or its associated external investors assume fully the risk associated with the uncertainty of improvement cost and project operating and maintenance expenses. The external investors and the user firm generally share risks associated with uncertainty about the conservation project's technical performance, the utilization rate of the conservation improvement, and the price of energy (for valuing energy savings). A shared-savings arrangement may also contain special terms that shift these risk elements in different ways from those embodied in a standard shared-savings arrangement. For example, an external investor may require that shared-savings payments be made on the basis of a specified minimum utilization rate for an improvement, even though the energy user may actually operate the improvement at a lower rate than the specified minimum. In this way, the external investor reduces the risk associated with uncertain utilization of the conservation improvement.

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Example of a Shared-Savings Financing Arrangement

To assist in understanding the various financing arrangements, we have constructed an example of an energy conservation investment under each arrangement. The example investment is based on an actual project to retrofit an existing oil-fired boiler with a wood gasifier at a textile mill in Sri Lanka (see Exhibit 2.a for a summary of the financial and tax assumptions used in the analysis).

The accounting flows associated with a shared-savings arrangement to finance this investment are shown in Exhibit 2.b. The investment requires a capital outlay of US $485,000 and achieves a 40-percent reduction in energy use (and cost). Without taking account of any financial structure or tax considerations, the investment would achieve payback in less than 2 years following the initial capital outlay.[4] We assume that the investment is depreciated over a 5-year period on a straight-line basis and qualifies for a 10-percent investment tax credit (ITC).

The structure of the shared-savings agreement provides the external investor with 60 percent of the value of energy savings over a 10-year period, plus the ITC and depreciation. The energy user receives the remaining 40 percent of the value of energy savings, and is responsible for paying actual energy costs subsequent to the improvement. The external investor's outlay is financed with 35 percent equity cash and 65 percent debt. The debt is structured as constant principal and interest repayment to be repaid over a 7-year period at an interest rate of 14 percent. Debt payments are solely the responsibility of the external shared-savings investor, and are subordinate to the distribution of energy savings revenues between the energy user and the external investor.

As a result of this investment structure, the present value of after-tax cash flow to the external investor is almost $240,000 at a discount rate of 20 percent and assuming a marginal tax rate of 50 percent. The internal rate of return on after-tax cash flow for the 11-year period is 65.1 percent. Thus under this arrangement, the external investor would receive an attractive return on equity. At the same time, the energy user would receive an after-tax cash flow (again, assuming a 50-percent tax rate) with a present value of more than $264,000 at a 20 percent discount rate. The energy user achieves this improvement in cash flow and corporate net worth with no cash outlay.

[4] On the basis of our own experience in evaluating conservation opportunities in LDCs, investment opportunities with this payback potential are frequently available, but remain unexploited in industrial, commercial, and institutional facilities.

Exhibit 2.a

Financial and Tax Assumptions for Illustration of Conservation Financing Arrangements

Project description: Retrofit and existing oil-fired boiler with a wood gasifier.

Total capital outlay for improvement: U.S. $485,000.

Depreciation method: 5-year straight line.

Investment tax credit rate: 10 percent.

Expected reduction in energy use from investment: 40 percent.

Marginal tax rate on income for energy user and external investor: 50 percent.

Interest rate on debt financing: 14 percent, except for guaranteed payback loan at 18 percent.

SOURCE: Hagler, Bailly & Company.

Exhibit 2.b

EXAMPLE OF INNOVATIVE APPROACH TO CONSERVATION PROJECT FINANCING
FINANCING APPROACH: SHARED SAVINGS

TIME PERIOD	1	2	3	4	5	6	7	8	9	10	11
CAPITAL RELATED ACCOUNTS											
Capital Outlay for Improvement	485000										
Investment Tax Credit (0.10 x Capital Cost)		48500									
Depreciation (5 year Straight Line)		97000	97000	97000	97000	97000					
ENERGY COST SAVINGS											
Energy Cost without Improvement		637000	712000	797000	894000	1001000	1121000	1256000	1406000	1575000	1764000
Energy Cost with Improvement		382200	427200	478200	536400	600600	672600	753600	843600	945000	1058400
Value of Energy Savings		254800	284800	318600	357600	400400	448400	502400	562400	630000	705600
RETURNS TO THE SHARED SAVINGS INVESTOR											
(1) Equity Outlay (0.35 x Capital Outlay)	169750										
Debt Payments (65% of Capital Outlay Financed Over 7 years at an Interest Rate of 14%)		73514	73514	73514	73514	73514	73514	73514			
(2)-Interest Payment		44135	40022	35333	29988	23894	16947	9028			
(3)-Principal Payment		29379	33492	38181	43526	49620	56567	64486			
(4) Investor's Share of Energy Savings (.6 x Value of Energy Saved)		152880	170880	191280	214560	240240	269040	301440	337440	378000	423360
(5) Depreciation		97000	97000	97000	97000	97000					
(6) Investor's Taxable Income [(4)-(2)-(5)]		11745	33858	58947	87572	119346	232093	292412	337440	378000	423360
(7) Investment Tax Credit		48500									
(8) Investor's Income Tax [(0.5 x (6))-(7)]		-42628	16929	29473	43786	59673	126046	146206	168720	189000	211680
(9) Investor's After Tax Cash Flow [(6)-(8)+(5)-(1)-(3)]	-169750	121994	80437	88293	97260	107053	69480	81720	168720	189000	211680
RETURNS TO THE ENERGY USER											
(10) Energy User's Share of Energy Savings (.4 x Value of Energy Saved)		101920	113920	127520	143040	160160	179360	200960	224960	252000	282240
(11) Tax on Energy User's Increase in Before Tax Income [.5 x (10)]		50960	56960	63760	71520	80080	89680	100480	112480	126000	141120
(12) Energy User's After Tax Cash Flow [(10)-(11)]		50960	56960	63760	71520	80080	89680	100480	112480	126000	141120

Present Value of Investor's After Tax Cash Flow at 20%: 237436

Present Value of Energy User's After Tax Cash Flow at 20% 264200

Joint-Venture Arrangement Between an Energy User and an External Investor

A joint-venture arrangement between an energy user and an external investor is a variation of the shared-savings agreement. As in a shared-savings agreement, an external investor provides the capital (or most of it) required to undertake an energy conservation project. The energy user provides the site/opportunity for the investment. However, in contrast to the shared-savings agreement, the investor and the energy user have more flexibility in tailoring the joint-venture arrangement to suit their specific risk/return objectives. The flexibility afforded by the joint-venture arrangement makes this financing arrangement attractive for large industrial projects where both the energy user and the external investor wish to control the construction and operation of the project.

Arrangement Structure

In a joint-venture arrangement, the external investor and the energy user form a separate investor entity to manage the construction and operation of the conservation project. The investor entity might be a corporation, a general partnership, or a limited partnership. For example, in a limited partnership, the energy user may assume the role of general partner, with the external investor(s) acting as the limited partner(s). Under this arrangement, the energy user retains management control over the construction and operation of the conservation improvement, while the external investor/limited partner receives the tax benefits of project ownership.

The financial structure of a joint venture is usually similar to that of a shared-savings agreement, and typically consists of 30 to 40 percent equity and 60 to 70 percent debt. For some investments (e.g., those involving substantial capital assets with resale value), the debt may be project-secured. However, the debt more generally will have to be supported by the assets of the external investor or the energy user or both.

The financing benefits of a joint venture depend on the terms of the specific agreement. Generally, the external investor is responsible for providing the bulk of the capital required for the conservation project, and the energy user receives its share of the benefits of the conservation improvement with little or no front-end investment. Whether a joint venture will provide off-balance-sheet/off-credit financing will depend on the extent of minimum payment and debt support obligations assumed by the energy user.

A joint-venture agreement specifies procedures for sharing the benefits of constructing and operating the conservation improvement. As in a shared-savings agreement, revenue to the joint venture is generally determined by first estimating the energy costs the user would have incurred in the absence

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of the conservation improvement, and then subtracting actual energy costs from the estimated costs.

In a joint venture, income to both the external investor and the energy user is generally subordinate to the repayment of project debt. This provision represents a key difference between the financial risk accepted by the external investor (assuming the external investor serves as guarantor for the debt) in a joint venture and a shared-savings agreement (i.e., in a shared-savings agreement, debt payments are solely the responsibility of the external investor). Other elements of project risk are shared by the energy user and the external investor on the basis of the terms of the joint-venture agreement.

A joint-venture agreement usually contains provisions for sharing the project's non-energy operating costs; ensuring minimum project utilization rates (and associated payments from the energy user to the external investor); and, as noted above, managing other elements of project risk (e.g., the use of special formulas to manage the risk of uncertain energy prices).

Example of a Joint Venture

To illustrate the joint-venture arrangement, we use the textile mill investment opportunity that we used in the shared-savings example. The accounting flows for the joint-venture example are presented in Exhibit 2.c. In this example, the energy user assumes the role of general partner in a limited partnership and is responsible for 5 percent of the capital outlay for the investment opportunity. The limited partner/external investor is responsible for 95 percent of the capital outlay, which is again financed at 65 percent debt and 35 percent equity cash.

During the operation of the joint venture, the energy user remains responsible for paying the actual energy costs that are incurred after the conservation improvement has been made. Revenue to the partnership is defined as the value of energy savings. Repayment of the limited partner's debt takes priority over the distribution of revenues between the general partner and limited partner. Specifically, the limited partner/external investor receives 30 percent of the value of net energy savings (i.e., gross energy savings less debt payments), the general partner receives 70 percent of the value of net energy savings. The limited partner also receives the depreciation, investment tax credit, and interest deduction benefits. As a result of these distributions, the limited partner/external investor receives a cash flow with a present value of more than $135,000, discounted at 20 percent and assuming a 50 percent marginal tax rate. The limited partner's after-tax cash flows yield an internal rate of return of 50.6 percent. The present value of cash flow benefits to the energy user/general partner is almost $369,000, discounted at 20 percent and assuming a 50-percent marginal tax rate.

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Exhibit 2.c

EXAMPLE OF INNOVATIVE APPROACH TO CONSERVATION PROJECT FINANCING
FINANCING APPROACH: JOINT VENTURE (LIMITED PARTNERSHIP WITH ENERGY USER AS GENERAL PARTNER)

TIME PERIOD	1	2	3	4	5	6	7	8	9	10	11
CAPITAL RELATED ACCOUNTS											
Capital Outlay for Improvement	485000										
Investment Tax Credit (0.10 x Capital Cost)		48500									
Depreciation (5 year Straight Line)		97000	97000	97000	97000	97000					
ENERGY COST INFORMATION											
Energy Cost without Improvement		637000	712000	797000	894000	1001000	1121000	1256000	1406000	1575000	1764000
Energy Cost with Improvement		382200	427200	478200	536400	600600	672600	753600	843600	945000	1058400
Value of Energy Savings		254800	284800	318800	357600	400400	448400	502400	562400	630000	705600
RETURNS TO THE LIMITED PARTNER /EXTERNAL INVESTOR											
Limited Partner's Capital (95% of total)	460750										
(1) Equity Outlay (0.33 x Capital Outlay)	161263										
Debt Payments (65% of Ltd Partner's Outlay Financed Over 7 years at an Interest Rate of 14%)		69838	69838	69838	69838	69838	69838	69838			
(2)-Interest Payment		45323	41891	37979	33518	28433	22637	16029			
(3)-Principal Payment		24515	27947	31860	36320	41405	47201	53810			
(4) Investor's Revenue (.30 x Value of Energy Savings less Debt Payments)		55489	64489	74689	86329	99169	113569	129769	168720	189000	211680
(5) Depreciation		97000	97000	97000	97000	97000					
(6) Investor's Taxable Income [(4)-(5)+(3)]		-16997	-4564	9548	25649	43573	160770	183578	168720	189000	211680
(7) Investment Tax Credit		48500									
(8) Investor's Income Tax [(0.5 x (6))-(7)]		-56998	-2282	4774	12824	21787	80385	91789	84360	94500	105840
(9) Investor's After Tax Cash Flow [(4)-(8)-(1)]	-161263	112487	66771	69914	73504	77382	33184	37979	84360	94500	105840
RETURNS TO THE ENERGY USER											
(10) Energy User's Capital (0.05 x Outlay)	24250										
(11) Energy User's Revenue (.70 x Value of Energy Savings less Debt Payments)		129473	150473	174273	201433	231393	264993	302793	393680	441000	493920
(12) Tax on Energy User's Increase in Before Tax Income [.5 x (11)]		64737	75237	87137	100717	115697	132497	151397	196840	220500	246960
(13) Energy User's After Tax Cash Flow [(11)-(10)-(12)]	-24250	64737	75237	87137	100717	115697	132497	151397	196840	220500	246960

Present Value of Investor's After Tax Cash Flow at 20%: 133492

Present Value of Energy User's After Tax Cash Flow at 20% 368718

Energy Service Agreement

An energy service agreement is similar to a shared-savings financing arrangement in that an external investor provides the capital for conservation improvements at the facility of the energy user. The energy user makes no cash outlays and incurs no financial obligations in allowing the energy-related capital improvement to be installed. However, the agreement differs from the shared-savings agreement in the manner in which the energy service firm/external investor receives its financial return.

Arrangement Structure

Under an energy service agreement, the energy service firm/external investor agrees to provide the energy user with specified energy services (e.g., heat and air conditioning, hot water, lighting and refrigeration) at a fixed aggregate cost or unit price that is less than the cost the energy user would incur for the specified energy services in the absence of the conservation improvement. The aggregate cost or unit price will often be specified as a fraction (e.g., 80-90 percent) of the energy costs that would have been incurred in the absence of any energy-related investments. In other agreements, the price is set at a fixed value subject to escalation with energy prices.

The energy service firm installs those conservation improvements that it has identified as being economically advantageous and necessary to earn an adequate return, given the pricing agreement for providing energy services. After installing the conservation improvements, the user firm no longer makes direct payments to utilities and fuel suppliers for its energy use; instead, the user pays the energy service firm, and the energy service firm is responsible for all payments to utilities and fuel suppliers.

The energy service firm earns a return on its conservation investment by providing the specified energy services at a cost (including current operating and maintenance expenses and an allowance for recovery of and return on the capital invested for the conservation improvement) that is less than the amount paid by the energy user to the energy service firm/external investor for the energy services. In addition, the energy service firm generally receives the tax benefits (i.e., depreciation and investment tax credits) associated with ownership of the conservation improvement. The energy service firm may finance the conservation improvement from its own corporate resources or syndicate the investment to other investors (e.g., through a limited partnership).

As in a shared-savings agreement, the energy service firm is fully responsible for maintaining the conservation improvement during the term of the energy service agreement, which typically ranges from 7 to 15 years. At

the end of the service agreement, the energy user generally has the option of renewing the agreement or purchasing the conservation improvement.

In an energy service agreement, the energy service firm fully assumes the risks associated with the uncertainty of an improvement's capital cost, operating and maintenance expense, and technical performance. Unless the service agreement contains a provision allowing the energy user's payment to the service firm to escalate with energy prices, the energy service firm also fully assumes the risk of uncertain energy prices. The user firm and the energy service firm generally share the risk associated with uncertainty about the facility's utilization rate. However, depending on the structure of the agreement, the nature of risk distribution may be adversary rather than collaborative. That is, if the agreement involves a fixed payment for energy services, the user firm benefits as the rate of facility use (and presumably energy use) increases; however, the energy service firm incurs a higher energy cost as the rate of facility use increases. To offset this risk, the energy service firm may insist that the energy consumption level on which the user firm's monthly payments are based be adjusted to reflect higher-than-anticipated facility utilization rates.

The chief financing benefit of an energy service agreement is that the energy user obtains the benefits of energy conservation improvements without any front-end cash outlay. However, whether an energy service agreement will qualify for off-balance-sheet/off-credit financing depends on the terms of the agreement. Specifically, most energy service agreements involve minimum fixed payments, an obligation that, like a lease, might have to be reported in a firm's financial statements. Whether an energy service agreement would have to be reported as a financial liability will depend on the magnitude of the energy service payments and accepted accounting practices regarding such matters as fuel contracts. For example, many firms enter fuel or power purchase contracts that involve minimum-take provisions;[5] however, under typical accounting conventions, such commitments are not usually reported in financial statements.

Example of an Energy Service Agreement

The accounting flows associated with an energy service agreement used to finance the wood gasifier retrofit at the textile mill are shown in Exhibit 2.d. The major difference in the accounting flows between the shared-savings agreement and the energy service agreement is that in the energy service agreement the energy service firm is responsible for paying the energy costs

[5] That is, the purchaser agrees to pay for a specified minimum quantity of fuel even if he does not need it (or, for that matter, receive it) in a contract period. Another name for such an arrangement is a take-or-pay contract.

Exhibit 2.d

EXAMPLE OF INNOVATIVE APPROACH TO CONSERVATION PROJECT FINANCING
FINANCING APPROACH: ENERGY SERVICE AGREEMENT

TIME PERIOD	1	2	3	4	5	6	7	8	9	10	11
CAPITAL RELATED ACCOUNTS											
Capital Outlay for Improvement	485000										
Investment Tax Credit (0.10 x Capital Cost)		48500									
Depreciation (5 year ACRS)		97000	97000	97000	97000	97000					
ENERGY COST INFORMATION											
Energy Cost without Improvement		637000	712000	797000	894000	1001000	1121000	1256000	1406000	1575000	1764000
Energy Cost with Improvement		382200	427200	478200	536400	600600	672600	753600	843600	945000	1058400
Value of Energy Savings		254800	284800	318800	357600	400400	448400	502400	562400	630000	705600
RETURNS TO THE ENERGY SERVICE FIRM/INVESTOR											
(1) Equity Outlay (0.35 x Capital Outlay)	169750										
Debt Payments (65% of Capital Outlay Financed Over 7 years at an Interest Rate of 14%)		73514	73514	73514	73514	73514	73514	73514			
(2)-Interest Payment (-		44135	40022	35333	29988	23894	16947	9028			
(3)-Principal Payment		29379	33492	38181	43526	49620	56567	64486			
(4) Investor's Revenue (.90 x Energy Cost Without Improvement)		573300	640800	717300	804400	900900	1008900	1130400	1265400	1417500	1587600
(5) Energy Cost Paid by Investor		382200	427200	478200	536400	600600	672600	753600	843600	945000	1058400
(6) Depreciation		97000	97000	97000	97000	97000					
(7) Investor's Taxable Income [(4)-(2)-(5)-(6)]		49965	76578	106767	141212	179406	319353	367772	421800	472500	529200
(8) Investment Tax Credit		48500									
(9) Investor's Income Tax [(0.5 x (7))-(8)]		-23518	38289	53383	70606	89703	159676	183886	210900	236250	264600
(10) Investor's After Tax Cash Flow [(7)-(9)+(6)-(1)-(3)]	-169750	141104	101797	112203	124088	137083	103110	119400	210900	236250	264600
RETURNS TO THE ENERGY USER											
(11) Energy User's Savings [Energy Cost Without Improvement - (4)]		63700	71200	79700	89400	100100	112100	125600	140600	157500	176400
(12) Tax on Energy User's Increase in Before Tax Income [.5 x (11)]		31850	35600	39850	44700	50050	56050	62800	70300	78750	88200
(13) Energy User's After Tax Cash Flow [(11)-(12)]		31850	35600	39850	44700	50050	56050	62800	70300	78750	88200

Present Value of Investor's After Tax Cash Flow at 20%: 336311

Present Value of Energy User's After Tax Cash Flow at 20%: 165125

for the energy user. The external investor receives a payment from the energy user that is based on gross energy costs without any conservation improvement, rather than the value of energy savings as in the shared-savings arrangement. In our example, the external investor receives a payment equal to 90 percent of the energy costs that would have been incurred without the retrofit improvement. As a result, the energy user receives a benefit equal to 10 percent of the energy costs without the improvement. The external investor also receives the depreciation and ITC benefits that result from the project.

The investment is financed by the energy service firm/external investor with 35 percent equity cash and 65 percent debt, to be repaid over 7 years at an interest rate of 14 percent. At a discount rate of 20 percent and an assumed 50 percent marginal tax rate, the present value of after-tax cash flows to the energy service firm exceeds $336,000. The investor's after-tax cash flows yield an internal rate of return of 74.2 percent. The present value of cash flow benefits to the energy user is more than $165,000. That the external investor receives a higher return under this arrangement than under shared savings does not mean that energy service agreements are always less advantageous to the energy user than shared-savings arrangements. This difference results from the numerical terms used to illustrate the financing arrangements.

Variable-Payment Loan

The variable-payment loan differs from the three preceding financing arrangements in that the external funds are provided through debt rather than equity-oriented financing, and ownership of the conservation improvement accordingly rests with the energy user. The variable-payment loan incorporates two features that are designed to assist the energy user in financing a conservation project:

- The debt payment schedule is structured to maximize the likelihood that the payment in any period will be less than the value of energy savings achieved in that period. As a result, an energy user should achieve a positive cash flow on a conservation investment immediately following installation of the conservation improvement and throughout the period during which the loan is being repaid.

- Subject to a minimum payment, loan payments are set to vary directly with the value of energy savings. That is, the higher the implicit cash flow from energy savings during a period, the higher the energy user's debt principal payment in that period. The variable-payment provision is designed to reduce the aversion of many energy users to assuming fixed-repayment obligations for conservation improvements that produce energy savings that may

vary over time and that are virtually certain to produce negative cash flows at some point, usually early in the repayment period.

Variable-payment loans have been issued in industrialized countries by electric utilities, government entities, and occasionally banks and other traditional creditors. This arrangement has been used primarily to finance conservation projects in the commercial, institutional, and residential sectors (although it could be applied in other sectors). For example, Citizens Conservation, Inc., a conservation financing organization operating in Massachusetts, has arranged numerous variable-payment loans to finance conservation improvements in low-income multi-family housing units and in non-residential structures owned or occupied by non-profit organizations. A similar financing program is being considered for implementation in the industrial and buildings sectors in the Philippines under the AID-sponsored Technology Transfer for Energy Management program.

Arrangement Structure

The specific structure of a variable-payment loan depends on the creditor's willingness to accept an uncertain debt repayment stream. Typically, the creditor evaluates the conservation opportunities at an energy user's facility. For economically attractive opportunities, the creditor extends a loan to cover a substantial share (e.g., 80 to 100 percent) of the cost of installing the conservation improvement. The creditor and energy user then agree on a formula for estimating the cost of energy that the energy user would incur without the improvement. The energy user agrees to make a loan payment in each period equal to a fraction (e.g., 75 percent) of the energy cost savings in a period. The savings equal the difference between the projected energy costs without the improvement and actual energy costs. The loan agreement also specifies a minimum loan payment, which is usually the payment required to retire the loan in 1.5 to 2 times longer than the repayment period that would occur if the improvement performs to expectations in achieving energy savings.

In some variable-payment loan programs, the energy user makes utility or fuel payments directly to the creditor. These payments are generally set at the level of estimated energy costs that would occur in the absence of the conservation improvement. The creditor, in turn, makes a payment equal to the energy user's actual energy cost to the utility or fuel supplier. The residual is used to repay the loan and rebate a "dividend" to the energy user according to the terms of the loan agreement.

Under the variable-payment loan arrangement, the energy user assumes the risks of project technical and economic performance. The creditor assumes the risk of loan default that would normally be accepted by a creditor. In addition, the creditor accepts greater than usual risk associated with

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uncertainty of the rate at which the loan will be repaid. Of course, the creditor may shift some market-related risks to the energy user by using a variable interest rate loan. The extent of default risk accepted by the creditor will depend on the debt security required by the creditor. Usually, this loan arrangement has been used by utility firms, which may collect on defaulted loans through utility rates, or in conjunction with a government-provided credit guarantee. In these cases, the energy user/debtor generally would not be required to post any collateral security to support the loan.

Because the energy user remains liable for minimum loan payments in each period, the variable-payment loan usually does not provide off-balance-sheet/off-credit financing for a conservation project. However, as noted above, the loan arrangement offers significant financing benefits by providing the energy user with positive cash flow immediately following installation of the conservation investment and by largely reducing the risk associated with the fixed-payment obligations of a traditional loan. Moreover, since external financing is provided through a loan, the energy user retains ownership of the conservation improvement and accordingly receives the tax benefits (i.e., depreciation and tax credits) associated with the conservation project.

Example of a Variable-Payment Loan

To illustrate how the variable-payment loan could be used to finance the wood gasifier retrofit at the Sri Lanka textile factory, we assume that a creditor will extend credit for 90 percent of the capital outlay of the conservation improvement (see Exhibit 2.e). The loan terms include a minimum payment of $101,788 per year, which is based on a 7-year loan term at an interest rate of 14 percent. Actual debt payments until the debt is fully retired are the minimum payment or 75 percent of the value of energy savings, whichever is greater.

As shown in Exhibit 2.e, the high value of energy savings from the wood gasifier retrofit means that actual debt payments are based on energy savings, not on the minimum payment. In the example, the actual debt repayment period is less than 3 years. Debt payments by the energy user are first applied to interest on the outstanding debt balance and the residual is applied to principal. In this way, the creditor is assured of receiving the 14 percent annual interest return on the loan, even though the principal repayment schedule does not match the expected 7-year repayment profile. The equivalence in value of the actual and expected loan repayment profiles is demonstrated by computing the present value of the creditor's net revenue stream at a discount rate of 14 percent. As illustrated in the exhibit, the present value of the creditor's revenue stream (treating the initial extension of credit as a negative revenue entry) is zero.

Exhibit 2.e

EXAMPLE OF INNOVATIVE APPROACH TO CONSERVATION FINANCING
FINANCING APPROACH: VARIABLE PAYMENT LOAN

TIME PERIOD	1	2	3	4	5	6	7	8	9	10	11
CAPITAL RELATED ACCOUNTS											
Capital Outlay for Improvement	485000										
Investment Tax Credit (0.10 x Capital Cost)		48500									
Depreciation (5 year Straight line)		97000	97000	97000	97000	97000					
ENERGY COST INFORMATION											
Energy Cost without Improvement		637000	712000	797000	894000	1001000	1121000	1256000	1406000	1573000	1764000
Energy Cost with Improvement		382200	427200	478200	536400	600600	672600	753600	843600	945000	1058400
Value of Energy Savings		254800	284800	318800	357600	400400	448400	502400	562400	630000	705600
RETURNS TO THE ENERGY USER											
(1) Equity Outlay (0.10 x Capital Outlay)	48500										
(2) Value of Energy Savings		254800	284800	318800	357600	400400	448400	502400	562400	630000	705600
Minimum Debt Payment (90% of Capital Outlay Financed Over 7 years at an Interest Rate of 14%)		101788	101788	101788	101788	101788	101788	101788			
Remaining Principal Balance		436500	306510	133821	0	0	0	0	0	0	0
Actual Debt Payment (75% of Energy Savings)		191100	213600	154836	0	0	0	0	0	0	0
(3)-Interest Payment		61110	42911	19015	0	0	0	0	0	0	0
(4)-Principal Payment		129990	170689	133821	0	0	0	0	0	0	0
(5) Depreciation		97000	97000	97000	97000	97000					
(6) Energy User's Taxable Income [(2)-(3)-(5)]		96690	144889	202785	260600	303400	448400	502400	562400	630000	705600
(7) Investment Tax Credit		48500									
(8) Energy User's Income Tax [(0.5 x (6))-(7)]		-155	72444	101393	130300	151700	224200	251200	281200	315000	352800
(9) Energy User's After Tax Cash Flow [(2)-(3)-(4)-(8)-(1)]	-48500	63855	-1244	62571	227300	248700	224200	251200	281200	315000	352800
RETURNS TO THE CREDITOR											
(10) Extension of Credit	436500										
(11) Repayment of Principal and Interest		191100	213600	154836	0	0	0	0	0	0	0
(12) Creditor's Revenue Stream [(11)-(10)]	-436500	191100	213600	154836	0	0	0	0	0	0	0

Present Value of Energy User's After Tax Cash Flow at 20%: 481863

Present Value of Creditor's Revenue Stream at 14%: 0

In this arrangement, the energy user receives 25 percent of the value of energy savings until the loan is repaid and 100 percent thereafter. In addition, since the energy user owns the conservation improvement, the energy user receives the investment tax credit and depreciation tax benefits. As a result of this financing arrangement, the energy user receives a present value of after-tax cash flow of almost $500,000 (discounted at 20 percent). The return received by the energy user is higher than under the other financing arrangements, since the energy user has accepted a greater risk in undertaking the investment.

Limited-Term, Guaranteed-Payback Loan

The limited-term, guaranteed-payback loan is similar to the variable-payment loan in that the energy user's loan payments vary with the value of energy savings in any time period and the sum of payments for actual energy use and loan repayments cannot exceed the energy cost that would have been incurred without the conservation improvement.

However, in a key difference with the variable-payment loan, the creditor in a limited-term, guaranteed-payback loan accepts the risk that a conservation improvement may not achieve payback within a specified period of time. Thus, the creditor shares directly in the risk of the project's technical and economic performance.

The guaranteed-payback loan is currently being used by the Canadian national conservation financing organization, Canertech Conservation, Inc., to finance conservation improvements in industrial and commercial applications.

Arrangement Structure

The procedures for initiating a limited-term, guaranteed-payback loan are similar to those for a shared savings financing arrangement. The creditor first evaluates conservation investment opportunities at an energy user's facility and then provides debt financing for up to 100 percent of the capital requirements for those opportunities that meet the creditor's expected return criteria. The debt repayment terms include a guarantee from the creditor that the value of energy saved by the improvement will be adequate to retire the loan within a specified period of time (i.e., the limited term), typically 1.5 to 2 times the loan amortization period that would be anticipated if the improvement achieves the expected level of technical and economic performance.

The debt repayment mechanism works as follows. After installing an energy improvement, the energy user makes periodic payments to the creditor equal to energy costs that would have been expected without the conservation

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improvement. The creditor pays the energy user's energy or utility bills and uses the residual to amortize the loan. Depending on the terms of the loan agreement, the creditor may provide a cash rebate to the energy user to offset the energy user's net cash tax liability on income generated by the conservation improvement.[6] If the energy savings are insufficient to retire the loan within the specified time limit on the loan, the creditor forgives the remaining principal balance on the loan.

In this arrangement, the energy user receives the tax benefits associated with project ownership, which partially offset the tax liability on the incremental income for the project. After the loan has been retired or forgiven, the energy user resumes responsibility for energy and utility payments and receives the full value of energy savings produced by the conservation improvement. Accordingly, the energy user has an incentive to maintain the conservation improvement and achieve maximum energy savings during the loan repayment period.

Under this arrangement, the creditor accepts the normal risks of loan default. In addition, the creditor shares with the energy user the risks associated with uncertainty about the project's technical and economic performance. Because of this added risk, the creditor requires an interest rate several points (e.g., 2 to 4) higher than the rate that would be offered on conventional secured loans to commercial/industrial organizations.

The guaranteed-payback loan generally offers significant financing benefits to the energy user. For example, under this financing arrangement, conservation improvements are installed at little or no out-of-pocket cost to the energy user. In addition the loan arrangement generally qualifies for off-balance-sheet/off-credit financing because the energy user is not obligated to retire the loan or, indeed, even to make loan payments.

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[6] An energy conservation investment by a business enterprise should have the effect of reducing operating costs and (assuming revenues are not adversely affected) thus increasing net operating income (i.e., revenues less operating costs). In the simplest case, the entire value of energy savings would become taxable income to the enterprise. However, the tax codes of most countries will allow the income generated by an investment (such as a conservation improvement) to be offset by depreciation of the capital outlay. In addition, interest payments are usually tax-deductible (note, however, that principal payments are not generally tax-deductible). As a result, the net taxable income from a conservation investment will generally be positive but less than the value of energy savings. In this light, if the energy user is to avoid negative cash flow on the investment, the user must, in effect, set aside a fraction of the value of energy savings to cover the incremental tax liability and thus cannot apply the full value of energy savings to loan repayment.

Example of a Limited-Term, Guaranteed-Payback Loan

To illustrate the limited-term, guaranteed-payback loan, we again assumed the creditor would extend financing for 90 percent of the capital cost of the conservation improvement at the Sri Lanka textile plant (see Exhibit 2.f). The terms of the loan include a guarantee by the creditor that the value of energy savings will be adequate to retire the loan at an 18-percent interest rate in no more than 8 years. The creditor requires a higher interest rate on the loan than in the variable payment arrangement to compensate for the risk that the creditor will have to forgive a portion of the loan if energy savings are less than expected. During the loan repayment period, the textile plant remits to the creditor the estimated energy cost that would be incurred if the improvement were not undertaken. The creditor first applies the payment to cover actual energy costs, and then uses the residual to make loan payments.

In this example, the creditor rebates an amount to the energy user that is adequate to cover the energy user's tax liability on the income from the conservation improvement, net of depreciation and interest expenses. Without such a provision, the energy user would incur incremental negative cash flow during the loan repayment period if the entire value of energy savings were applied to loan repayment (i.e., only interest, and not principal payments, are deductible from income before taxes, principal payments are made from after-tax cash). As a result of this provision, the fraction of energy savings applied to debt repayment averages about 80 percent.

On the basis of expected annual energy savings (i.e., 40 percent of $637,000), the loan would be repaid in approximately 27 months. In the example, the loan is repaid in this time period as actual energy savings equal the expected value in the first 3 years of projected operation. Loan payments are first applied to interest at the rate of 18 percent on the outstanding debt balance; the residual is used to repay principal. As a result, the present value of the creditor's revenue stream discounted at 18 percent is zero.

The energy user's after-tax cash flow is zero in the first 2 years of improvement operation, except for the receipt of the ITC, which offsets the equity cash outlay for the improvement. In the third year following installation (year 4 in Exhibit 2.f), cash flow turns positive as the loan is paid off. In subsequent years, the energy user receives the full value of energy savings and achieves a present value of after-tax cash flow of more than $470,000 (discounted at 20 percent and assuming a marginal tax rate of 50 percent).

Exhibit 2.f

EXAMPLE OF INNOVATIVE APPROACH TO CONSERVATION PROJECT FINANCING
FINANCING APPROACH: LIMITED TERM, GUARANTED PAYBACK LOAN

TIME PERIOD	1	2	3	4	5	6	7	8	9	10	11
CAPITAL RELATED ACCOUNTS											
Capital Outlay for Improvement	485000										
Investment Tax Credit (0.10 x Capital Cost)		48500									
Depreciation (5 year Straight Line)		97000	97000	97000	97000	97000					
ENERGY COST INFORMATION											
Energy Cost without Improvement		637000	712000	797000	894000	1001000	1121000	1256000	1406000	1575000	1764000
Energy Cost with Improvement		382200	427200	478200	536400	600600	672600	753600	843600	945000	1058400
Value of Energy Savings		254800	284800	318800	357600	400400	448400	502400	562400	630000	705600
RETURNS TO THE ENERGY USER											
(1) Equity Outlay (0.10 x Capital Outlay)	48500										
(2) Value of Energy Savings		254800	284800	318800	357600	400400	448400	502400	562400	630000	705600
Remaining Principal Balance (90% of Capital Outlay Financed at 18%; Guaranteed Payback Within 8 Years)		436500	299885	133975	0	0	0	0	0	0	0
Actual Debt Payment (100% of Energy Savings Less an Allowance for Tax Liability)		215185	217890	160450	0	0	0	0	0	0	0
(3)-Interest Payment		78570	53979	24475	0	0	0	0	0	0	0
(4)-Principal Payment		136615	163910	133975	0	0	0	0	0	0	0
(5) Depreciation		97000	97000	97000	97000	97000					
(6) Energy User's Taxable Income [(2)-(3)-(5)]		79230	133821	197325	260600	303400	448400	502400	562400	630000	705600
(7) Investment Tax Credit		48500									
(8) Energy User's Income Tax [(0.5 x (6))-(7)]		-8885	66910	98662	130300	151700	224200	251200	281200	315000	352800
(9) Energy User's After Tax Cash Flow [(2)-(3)-(4)-(8)-(1)]	-48500	48500	0	59688	227300	248700	224200	251200	281200	315000	352800
RETURNS TO THE CREDITOR											
(10) Extension of Credit	436500										
(11) Repayment of Principal and Interest		215185	217890	160450	0	0	0	0	0	0	0
(12) Creditor's Revenue Stream [(11)-(10)]	-436500	215185	217890	160450	0	0	0	0	0	0	0

Present Value of Energy User's After Tax Cash Flow at 20%: 470531

Present Value of Creditor's Revenue Stream at 18%: 0

True Lease

The lease is the least innovative and offers the fewest benefits of the six arrangements for financing conservation investments. The primary financing benefits of a true lease are to transfer the tax benefits associated with project ownership to a presumably higher tax bracket external investor who will receive a higher cash flow benefit from their use, and to provide for installation of a conservation improvement with no front-end cash outlay by the energy user. In return, the energy user will typically retain a higher share of the economic benefits from an energy investment under a lease than under the other equity-oriented financing arrangements (e.g., shared savings), which shift higher risk to the external investors.

To provide these benefits under the U.S. tax code, a lease may be structured as a true lease or a TEFRA financing lease (as defined by the Tax Equity and Financial Responsibility Act of 1982).[7] A true lease may be used to finance only non-limited-use property; that is, property that could be removed from a lessee's facility and installed and used at another location. Accordingly, true lease financing will generally be applicable only for limited categories of conservation improvements. As examples, lease financing has been used for water heating, space heating, refrigeration equipment, and cogeneration equipment, which are removable and reusable investments.

In 1982, the U.S. Congress defined the TEFRA financing lease, which relaxed the limitations on leasing of limited-use property and other restrictions pertaining to the purchase of leased assets by the lessee (these are explained below). Relaxation of the limited-use property restriction will allow a wider variety of conservation projects to be lease-financed. However, use of the TEFRA financing lease is restricted in other ways. For example, the lessor must be a corporation or partnership of corporations, which means TEFRA leases may not be syndicated to individual investors. There is also a limit on the amount of income tax reduction that may be obtained by the lessor through use of the TEFRA lease. Because the TEFRA lease only became generally available at the beginning of 1984, the acceptance and use of this financing arrangement for energy investments cannot be evaluated.

[7] The following discussion is based on the legal/institutional framework for leases in the United States. Although this discussion specifically pertains to the structure of leases as provided by the U.S. tax code and accounting conventions, it will illustrate the general concepts of lease financing. Of course, whether and how lease financing may be used in LDCs will depend on the tax code or other legal/institutional limitations in those countries that define the types of assets that may be leased and the structure of leases.

Arrangement Structure

In undertaking a lease financing for conservation investments, an energy user would typically select the desired improvement and arrange for its purchase by an investor entity that will subsequently serve as the lessor in the transaction. Frequently, an energy user will engage in a sale/leaseback transaction in which it first negotiates a long-term lease financing commitment, and then uses its own short-term credit to purchase and install the conservation improvement, and finally sells the installed improvement to the lessor. Like shared-savings financing, lease transactions are often financed by syndicating the investment in the leased assets through a limited partnership. In this case, the financial intermediary who negotiates the lease will typically serve as general partner; the limited partners, who will be high tax bracket investors, provide the bulk of the capital funds for the investment. Such financial arrangements are usually leveraged with a substantial fraction of debt (e.g., 60 to 80 percent) that is secured by the lease assets.

The structure of true leases is limited by the provisions of the tax code to ensure that, at the end of the lease, the lease property will have a substantial residual value and that the lessor will not have fully recovered the purchase price of the leased assets from the lease payments. That is, the lease transaction is not intended to be used by the energy user/lessee as a purchase or installment sale contract in which tax benefits are transferred to another taxpayer. To summarize, a true lease must generally comply with the following provisions:

- The lease may not transfer ownership of the leased assets to the lessee at the end of the lease at a pre-established price or require that the lessee purchase the leased assets (the lessee may have the option to renew the lease, purchase the assets at fair market value, or simply abandon the lease).

- The lease terms may not exceed 75 percent of the economic life of the asset; for the lessor to receive the investment tax credit in a transaction, the lease may not exceed 50 percent of the asset's economic life.

- The present value of lease payments over the life of the lease may not exceed 90 percent of the purchase price of the leased property less the investment tax credit.

- The lessee may have no investment in the leased asset or any pledge to support financing for the asset.

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- The lessor must be able to demonstrate that the lease arrangement is a profitable transaction for reasons other than receiving the tax benefits on the leased asset.

The TEFRA financing lease modifies the first of these limitations to permit the lessor and lessee to set a price in the lease agreement for purchase of the leased assets by the lessee at the end of the lease. This price may not be less than 10 percent of the purchase price of the leased asset.

Despite these rules, a lease is a relatively simple financing arrangement. The lease agreement will specify a lease term, the fixed periodic payment, and the maintenance responsibilities for the leased asset. The lease may also specify renewal and purchase options according to the provisions outlined above.

In a lease financing, the principal risk benefit obtained by the energy user/lessee is the protection against being the owner of potentially obsolete, low-valued equipment at the end of the lease term. That is, the lessor assumes the risk of asset obsolescence and low residual value. During the period of the lease, the lessee assumes the risk of uncertain technical and economic performance of the improvement. In addition, the lessee usually will assume the risk of equipment malfunction and repair; however, this risk may be shifted to the lessor.

As stated earlier, the principal financing benefits of a lease are the ability to obtain full external financing for an investment and the shifting of tax benefits to an external investor who values these benefits more highly than the lessee. Shifting the tax benefits should result in a lower effective cost of capital for the lessee than could be achieved if the lessee financed the conservation improvement on a traditional equity and debt basis. Because a lease financing involves a commitment to make fixed payments over the period of the lease, a lease will not usually qualify as off-balance-sheet/off-credit financing. The energy user/lessee will usually have to capitalize and report the lease payment obligation as a liability; the leased improvement will also be recognized as an asset. However, the combined effect will still be to increase the leverage of the firm's balance sheet.

Example of Lease Financing

Our example of the use of lease financing for installing a conservation improvement is presented in Exhibit 2.g. In this lease arrangement, we assume that the energy user/lessee enters a 7-year lease agreement involving a fixed annual payment of $84,875. As required by tax rules, the present value of lease payments is not greater than 90 percent of the cost of the leased asset, less the ITC. At the end of the lease term, the lessee has the option of purchasing the energy improvement at fair value. At all times, the

Exhibit 2.g

EXAMPLE OF INNOVATIVE APPROACH TO CONSERVATION PROJECT FINANCING
FINANCING APPROACH: LEVERAGED LEASE

TIME PERIOD	1	2	3	4	5	6	7	8	9	10	11
CAPITAL RELATED ACCOUNTS											
Capital Outlay for Improvement	485000										
Investment Tax Credit (0.10 x Capital Cost)		48500									
Depreciation (5 year Straight Line)		97000	97000	97000	97000	97000					
ENERGY COST INFORMATION											
Energy Cost without Improvement		637000	712000	797000	894000	1001000	1121000	1256000	1406000	1575000	1764000
Energy Cost with Improvement		382200	427200	478200	536400	600600	672600	753600	843600	945000	1058400
Value of Energy Savings		254800	284800	318800	357600	400400	448400	502400	562400	630000	705600
RETURNS TO THE LESSOR											
(1) Equity Outlay (0.20 x Capital Outlay)	97000										
Debt Payments (80% of Capital Outlay Financed Over 7 years at an Interest Rate of 14%)		90479	90479	90479	90479	90479	90479	90479			
(2)-Interest Payment		54320	49258	43487	36908	29408	20858	11111			
(3)-Principal Payment		36159	41221	46992	53571	61071	69620	79367			
(4) Lessor's Revenue		84875	84875	84875	84875	84875	84875	84875			
(5) Purchase of Leased Asset By Lessee; Treated as Capital Gain									194000		
(6) Depreciation		97000	97000	97000	97000	97000					
(7) Lessor's Taxable Income [(4)-(5)-(2)+(0.4x(5))]]]]		-66445	-61383	-55612	-49033	-41533	64017	73764	77600	0	0
(8) Investment Tax Credit		48500									
(9) Lessor's Income Tax [(0.5 x (7))-(8)]		-81723	-30691	-27806	-24517	-20767	32008	36882	38800	0	0
(10) Lessor's After Tax Cash Flow [(4)+(5)-(9)-(2)-(3)-(1)]	-97000	76119	25088	22202	18913	15163	-37612	-42485	153200	0	0
RETURNS TO THE ENERGY USER											
(11) Purchase of Leased Asset									194000		
(12) Energy User's Income (Value of Energy Savings less Lease Payments)		169925	199925	233925	272725	315325	363325	417325	562400	630000	705600
(13) Tax on Energy User's Increase in Before Tax Income [.5 x (12)]		84963	99963	116963	136363	157763	181763	208763	281200	315000	352800
(14) Energy User's After Tax Cash Flow [(12)-(13)-(11)]		84963	99963	116963	136363	157763	181763	208763	87200	315000	352800

Present Value of Lessor's After Tax Cash Flow at 20%: 19632

Present Value of Energy User's After Tax Cash Flow at 20% 495426

lessee/energy user receives the full value of energy savings while the lessor receives the tax benefits associated with ownership of the leased asset. The lessor finances the leased asset with 20 percent equity and 80 percent debt to be repaid at 14 percent over a period of 7 years.

In our example, the lessee elects to purchase the leased asset at the end of the lease term for a price of $194,000. The $194,000 is treated as capital gains income to the lessor on the fully depreciated assets; only 40 percent of the income is taxable. For simplicity, we have not initiated a new depreciation profile for the energy use after the purchase of the leased property. In addition, we have not applied the rules of ITC and depreciation recapture which might be required of the lessor on the sale of the lease property.

As a result of the lease financing, the lessor receives a present value of after-tax cash flow of $19,632 (discounted at 20 percent with a marginal tax rate of 50 percent). The present value of benefits for the lessee is $495,426.

POTENTIAL ROLES FOR THE PUBLIC SECTOR

The innovative financing arrangements described above could benefit LDCs by facilitating the flow of capital into conservation investments that might otherwise go unfunded. However, using these financing arrangements requires financial institutions able to evaluate the technical and economic risks associated with energy-related investments. In addition, the institutions must be willing to assume certain risks associated with the innovative financing arrangements. In return for accepting these risks, the creditors can expect higher returns than might be obtained from offering conventional loans to finance energy-related investments. Governments can play various roles in promoting the development of the needed financial infrastructure and the use of these innovative financing arrangements. We outline several potential assistance roles below.

The most direct public-sector role to assist in promoting use of innovative financing arrangements for energy-related investments would be to form a publicly-chartered finance corporation[8] that would be authorized to engage in any of the financing activities discussed in the preceding section. This corporation would be initiated with public capital. However, after a period

[8] As an alternative, existing public-sector finance corporations in LDCs (e.g., the Development Finance Corporation of Ceylon (DFCC) in Sri Lanka) could be used. The main sources of capital for such corporations are the multilateral development banks.

of start-up operations, the corporation would be able to gain access to private capital and perhaps become completely independent of government support.

Several financing organizations in industrialized countries that were publicly chartered for the purpose of introducing new financing methods or financial instruments have subsequently been able to tap private capital markets and operate without government support. Two examples in the United States are the Federal National Mortgage Association and the National Corporation for Housing Partnerships. Both corporations have been successful in increasing the flow of capital into the housing sector, and both currently operate without public support.

Another government role would be to sponsor demonstrations of the innovative financing arrangements. These demonstrations would be conducted jointly by a public agency and a private organization (e.g., a commercial bank, investment bank, utility firm). The public agency would provide technical assistance in identifying appropriate investment opportunities and in structuring the financing arrangements. The government might also guarantee the return of capital for the projects or provide other incentives (e.g., special tax credits) if such incentives were needed to entice private-sector participation in the demonstrations. Demonstration programs have been helpful in encouraging the use of energy-saving technologies and innovative methods for financing investments in conservation technologies. For example, the Government of the Philippines and AID are currently implementing an energy conservation technology demonstration program in the industry and buildings sectors, which includes innovative financing arrangements.[9] The program will initially support debt-oriented financing arrangements (e.g., the variable-payment and the limited-term, guaranteed-payment loans). After the first few years of activities, the program will consider sponsoring equity-oriented arrangements (e.g., shared savings). These demonstrations and subsequent dissemination of program results are expected to encourage wider use of the innovative financing arrangements.

A third role for government is to provide training and certification programs in energy auditing, and to instruct financing organizations on how to interpret audit results as a basis for evaluating a conservation investment opportunity. Creditors and other external investors often cite the inadequacy and inconsistent quality of engineering/economic evaluations of conservation projects as a reason for not providing capital for those projects. Certification of auditors and technical assistance with energy audits and analyses are programs that have been used successfully by governments in

[9] Technology Transfer for Energy Management Project, sponsored by AID in cooperation with the Philippine Bureau of Energy Utilization.

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industrialized countries to increase the willingness of creditors and investors to provide capital for conservation projects.

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ANNEX A: BASIC CONCEPTS IN FINANCING ENERGY CONSERVATION

The purpose of this Annex is to review and analyze in more detail the concepts introduced in Chapter 1. The Annex follows the same structure and organization as Chapter 1.

ECONOMICS OF ENERGY CONSERVATION AT THE ENTERPRISE LEVEL

The approach and considerations for evaluating an energy conservation project from the public-sector perspective will usually differ from that of the private-sector perspective in several important ways. As a result, even though a private-sector project may look highly beneficial from the public-sector perspective, it may remain unexploited because the results from the private-sector evaluation are not sufficiently attractive.

The following sections discuss the general procedures by which private enterprises evaluate conservation projects and highlight the sources of difference in public- and private-sector evaluation of projects.

Private Sector Evaluation of Conservation Projects

The general method by which a private enterprise evaluates an energy conservation project and decides whether or not to undertake it is called project **financial analysis.** A project financial analysis is conducted by:

1. Assembling information on all of a project's cash flows for the life of the project

2. Computing the after-tax net cash flow for each analysis period and

3. Calculating several measures that indicate the financial performance of the project.[1]

[1] This discussion is based on an analytic paradigm: the discounted cash flow analysis approach to investment decision-making. Not all private enterprises would apply this procedure; moreover, the level of sophistication implied in this discussion will not be uniformly met among those enterprises that do apply it. Nevertheless, an understanding of the analytic procedure and its implications for conservation investment decision-making is critical for public policy-makers who are charged with the responsibility of implementing programs to encourage conservation investments in the private sector.

The important considerations in performing a project financial analysis include:

- **Choosing an appropriate analysis period.** In conducting a project analysis, it is necessary to specify both the length of time over which the cash flows will be analyzed (the analysis period) and the time interval for the analysis (will the project be analyzed on a yearly, quarterly, or monthly basis?). In general, the project analysis should cover all or most of the project's expected life. However, if a project has a very long life, discounting will diminish the importance of very distant cash flows so that there is little value in extending the analysis to the end of the project's life (e.g., at a 15 percent discount rate, the present value of a cash flow 35 years in the future is less than one percent of its undiscounted value). The choice of a time interval for the analysis will depend on the length of the project's life and the construction period. The shorter the construction period and the project's life, the shorter should be the time interval for the analysis (e.g., projects of less than 5 years' duration might be analyzed on a monthly basis; projects of more than 5 years and less than 10 years duration might be analyzed on a quarterly basis; and projects of greater than 10 years duration might be analyzed on a yearly basis).

- **Encompassing all relevant cost and revenue items.** To give an accurate appraisal of a project's expected financial performance, the analysis must encompass all relevant cost and revenue items. Furthermore, these cash flow items must be estimated over time. In projecting the relevant cash flow items, it is often helpful to identify the categories of potential costs and revenues and ensure that each has been considered. The typical cost accounts might include: the engineering and design expenses for the project; the costs of acquiring and installing the project equipment (capital cost); indirect costs (loss in before-tax income) that may result from the reduction or shutdown of production activities while a project is being constructed; operating and maintenance costs and any additional energy consumed by the project. The "revenue" accounts of a conservation project may include the energy saved, any energy-related products, and any other saleable by-products (e.g., steam) that result from the project. These cost and revenue items must be estimated on an incremental basis: that is, the costs or revenues used in the analysis should be the *change* from costs and revenues without project implementation that will occur as a result of the project.

- Accounting for tax and financial effects. In addition to the cost and revenue accounts, other cash flows, which derive from tax and financial considerations, must be taken into account. The tax-related accounts will reflect: the tax treatment of capital outlays (i.e., whether they may be expensed or must be capitalized and subsequently depreciated for tax purposes); any tax benefits accorded the conservation investment (e.g., special energy tax credits for conservation investments); the extent of deductibility of special cost items (e.g., can construction period interest be expensed or must it be capitalized and amortized?); and the definition of taxable income and the applicable marginal tax rate. To specify the financing-related accounting items requires consideration of: the financial structure (debt/equity composition) of the project during construction; the financial structure of the project during operation; and the interest rate and repayment terms on project debt. This information will allow specification of the required equity contributions and the principal and interest payments due on project debt.

- Computing after-tax net cash flow. Net cash flow, rather than income or earnings, is generally recognized as the most important indicator of the effect of a project on the financial well-being of the sponsoring organization. Net cash flow is just that: the actual inflows and outflows of cash that result from a project. In computing net cash flow, it is important to distinguish between true cash effects and tax- or income-accounting effects. For example, the capital cost of a project will generally be treated as a negative cash flow item but will not be recognized for tax purposes at the time of the outlay. Rather, it will be depreciated. In turn, the subsequent tax-related "cost" -- depreciation-- is not a cash cost and, while it must be accounted for in computing taxes (which are a cash cost), it is not subtracted in computing net cash flow.

  Certain outlays associated with the financing of a project will also generate cash effects but are not part of an income analysis. For example, such cash cost items as equity contributions and principal payments on project debt, and the cash receipt item, debt drawdown, have a true cash effect but they are not tax-deductible, nor are they traditionally accounted for in the computation of income. A standard definition of net cash flow as it might apply to an energy conservation investment is:

  Net Cash Flow = "Revenues" from Energy Savings + Debt Drawdown - Project Installation Cost - Operating Costs - Taxes - Interest Payments on Project Debt - Principal Payments on Project Debt.

In this definition, it is assumed that the project installation cost is financed through a combination of debt and equity. However, the equity contribution during the project installation period does not appear explicitly in the accounting definition. Rather, it would be determined as a residual by subtracting Debt Drawdown from Project Installation Cost. That is, the firm will have to pay from its internal equity cash resources the amount of project installation cost that is not funded by debt. Alternatively, the project's installation cost could be split between the firm's equity cash contribution and debt applied to the project. In this case, the definition of cash flow would be:

Net Cash Flow = "Revenues" from Energy Savings - Equity Contribution - Operating Costs - Taxes - Interest Payments on Project Debt - Principal Payments on Project Debt.

In both formulas, taxes will generally be computed as:

Tax Payment = [Project Income - Operating Costs - Depreciation] x Marginal Tax Rate - Tax Credits (if applicable).

- **Specifying the appropriate target return on equity for discounted present value analysis.** After net cash flow is computed, the project financial analyst will generally compute a number of measures of financial performance. Some of these measures involve accumulating cash flows that occur at different times through the procedure of discounting. The discount rate used in such an analysis should be the after-tax equity return that could be obtained by the project sponsor on alternative investments with similar risk/uncertainty characteristics.

- **Accounting for the effect of financial structure on project performance.** In general, project analysis should incorporate the debt/equity structure and debt terms under which a project will most likely be financed. However, in performing a project financial analysis, it is important to recognize the effect of financial structure on expected project performance and risk. If the pure return on equity for a project (calculated with no debt financing) is higher than the cost of debt, increasing the debt component of project financing will always increase the expected after-tax return on equity (considering the effect of financial structure). This effect is called financial leverage. In the most naive application, increasing debt financing to obtain a higher return on equity appears to be a good way to improve project financial performance. However, at the same time that the expected return is increased by leverage, the uncertainty of expected return also

increases. Thus, the improved expected return is bought through an increase in project risk. In this light, it is often desirable to analyze a project under a range of financial structures to understand the extent to which leverage may be giving a misleading impression of high quality financial performance.

- Accounting for uncertainty. The final consideration to be discussed (and one that is often overlooked) is the effect of uncertainty on project risk. By risk, we mean the variation in a project's actual return about the expected return. Unfortunately, conservation projects have many sources of uncertainty and risk: uncertainty of technical performance; uncertainty of capital and operating costs; uncertainty of project construction schedule; uncertainty of the price of the energy products saved or consumed; and uncertainty of the project's rate of utilization. Because of the importance of risk (poorer-than-expected performance could cause a default on debt repayments and bankrupt a project sponsor), it is important to understand how financial performance could vary with variation in these uncertain factors. In performing uncertainty analyses, it is necessary to be somewhat speculative about the reasonably probable ranges of project performance and, if possible, attach probabilities to the poorer-than- and better-than-expected outcomes. Only in this way can the project financial analyst gain a reasonable sense of the risks an organization may be exposed to in undertaking a conservation project.

Some of the financial performance measures that the project financial analyst may calculate as the basis for deciding whether or not to undertake a project include:

- Present value of after-tax cash flow: the cumulated value of all project cash flows that have been discounted to the beginning of project development at the project sponsor's target after-tax return on equity. This value indicates the expected increase in the project developer's net worth as a result of undertaking the conservation project.

- Internal rate of return: the after-tax return on equity that causes the present value of after-tax cash flow to equal zero. This value is a measure of the project's financial performance per monetary unit of equity invested.

- Simple payback period: the length of time required for the project's cumulative, undiscounted cash flows to become positive, i.e., the "payback period". At this point, the equity investor will have recovered his cash equity investment. Unless the

project has a cash flow pattern in which cash flows subsequently become negative and cause the cumulative cash balance to become negative, the project should be "in the black" from this point forward.

- **Occurrence of operating periods with negative cash flow: an indicator of the financial stability/strength of the project.** If a project experiences negative cash flow during the operating period, the project sponsor will have to make up the cash losses and difficulty may be experienced in making debt principal payments. Failure to make debt payments could jeopardize the financial solvency of the project sponsor.

The prospective project sponsor should generally prefer projects that have the highest internal rate of return or, for a given investment amount, have the highest net present value.[2] These projects will yield the highest expected increase in the net worth of the project developer, which should normally be the chief objective of private enterprise. However, the other measures of financial performance may also influence the decisions of the prospective developer. For example, if projects have varying risk profiles, then the project developer may willingly accept a project with lower expected return but also lower risk. In addition, the sponsor may prefer projects with a more stable cash flow pattern even though they may have a lower expected return than some other projects.

If a prospective project sponsor finds more investment-quality projects than the capital available to fund them, then the project sponsor should choose the combination of projects, within the capital budgeting constraint, that yields the highest expected present value of net cash flow.

SOURCES OF DIVERGENCE IN PUBLIC- AND PRIVATE-SECTOR EVALUATION OF ENERGY CONSERVATION INVESTMENTS

In the following section, five general sources of divergence in the public- and private-sector evaluation of energy conservation investments are discussed:

- Differences in the valuation of benefits
- Differences in the valuation of costs

[2] In this discussion, we refer to the evaluation and selection of projects (as opposed to a single project) because, in most instances, conservation investments (and other capital investment opportunities as well) are presented to management as a slate of possibilities that are competing for a limited capital budget.

- Differences resulting from the presence of taxes
- Differences in the valuation of benefits and costs over time
- Additional considerations that may influence public sector judgments.

Valuing Benefits

From both the public policy and independent enterprise perspectives, the primary source of benefits for an energy conservation project will be the value of energy saved as a result of the project. The energy savings will be the reduction in the amount of an energy resource required by the enterprise or the economy to achieve the same level of production or consumption activity that was realized before undertaking the conservation project. Although the public policy and private enterprise perspectives will focus on the same energy savings, the value placed on the energy savings by the two perspectives may differ considerably. Below, we explain two sources of divergence: differences in the basic perception of energy prices, and differences resulting from the accounting by the public policy perspective for increases in the surplus value of consumption.[3]

With regard to divergences resulting from the perception of energy prices, the private perspective will value energy savings according to the price that would have been paid by the enterprise for the energy that is saved. However, from the public policy perspective, the appropriate price will be the opportunity cost to the economy of consuming additional units of the energy resource that is conserved by the project. If the energy resource conserved by the project is imported, the international market price will probably reflect the appropriate resource cost of consuming the energy resource; to import the energy resource, the economy must exchange domestically produced goods and services that have the same value in the world economy as the imported energy. However, even if the import market price is readily apparent to the enterprise, the enterprise may still use different prices for valuing the energy savings benefits if the government either subsidizes or taxes the consumption of the imported energy resource.

If the energy resource that is conserved by a project is obtained from within the country, the appropriate price for valuing the energy savings from the public-sector perspective will be more difficult to specify and may differ

[3] We explore other sources of divergence regarding the valuation of benefits in the section titled "Other Considerations." Although these "other considerations" might provide a basis for adjusting the valuation of benefits, there is usually greater difficulty or uncertainty in valuing them to the extent that they will not normally be accounted for in the monetarily-valued evaluation of benefits.

considerably from the posted price that will be observed by the enterprise. Specifically, the real resource cost of consuming the country's own energy resources (and the benefit from saving them) will be the value of productive resources consumed in producing the energy resource plus an allowance for the scarcity value (if any) of the resource (e.g., a renewable resource such as solar energy would have no scarcity value as long as surplus land were available for developing solar collectors). At a minimum, the measure of cost should exclude any taxes or other government-related payments that do not reflect payment for use of a productive resource. However, accurate estimation of the remaining cost components may be exceedingly difficult. For example, if the productive resources (e.g., labor and capital) previously used for producing energy resources will be idled because of a conservation project and not be used in an alternative production activity, the economy may actually have borne no real resource or opportunity costs in using these resources to produce the conserved energy resources. Accordingly, the production cost of the energy resource (and the benefit from its conservation) should not include the cost of the productive resources that become and remain idled as a result of the conservation project.

The second source of divergence between the public and private perspectives regarding the valuation of energy savings will be in the recognition of changes in the surplus value[4] to society from consuming those goods or services whose production cost may be reduced by the conservation project. An energy conservation project presumably increases the efficiency of a production activity by reducing the quantity of energy required to produce a good or service. The associated reduction in production costs may, in turn, lead to a reduction in product prices and an increase in the quantity of the goods or services consumed in the society. Both the reduction in price and the increase in consumption will increase the surplus value received by society.

The valuation of energy savings as discussed above will usually account for the major component of increase in surplus value. However, if the reduction in price of goods and services affected by the conservation project leads to an increase in production and consumption of those goods and services, there

[4] Surplus value is the collective amount by which consumers that purchase a good or service value the good or service in excess of the resource cost of its production, and is the net benefit to society associated with the production and consumption of goods and services. Some consumers may value a good or service by a large amount in excess of the resource cost of production, while others will value the good or service at very close to or at the same price as the resource cost of production. The surplus value will be split between consumers' surplus (which is the collective amount by which consumers value the good or service in excess of selling price) and producers" surplus (which is the collective amount by which price exceeds the resource cost of production); the distribution of the surplus value will depend on the pricing structure for the good of service.

will be an additional increase in surplus value that is not accounted for by simply valuing the energy savings at the resource or opportunity cost of production. The public policy analyst should attempt to estimate this change in surplus if there will be significant increases in the production and consumption of some goods or services because of a conservation program.

Valuing Costs

Similar considerations to those discussed for the valuation of benefits from the public policy perspective also apply to the valuation of costs. That is, the private enterprise will again value the costs of a conservation project on the basis of the prices it must pay. However, the appropriate measure of the cost of a conservation project from the public-sector perspective will be the opportunity or real resource cost, which is the value in alternative uses of the productive resources that are required for the conservation project. Again, the measure of resource cost will exclude such items as taxes or tariffs, which are merely transfer payments within the society and do not reflect the cost of using a productive resource. Also, the same considerations will apply regarding whether the resources are imported or supplied locally, and -- if supplied locally -- whether the resources would have been unemployed except for their use in the conservation project. These considerations are discussed in more detail below.

If the productive resources required to undertake a conservation project are imported, the international market price will usually be an accurate representation of the resource cost to the economy of importing the resource. If the resource is supplied locally, the public policy analyst will need to establish the resource cost to the economy of using the resources to develop energy conservation. Again, the analyst must be attentive as to whether or not the resources would have been employed in an alternative application. If the resources would have otherwise been unemployed, there will be no cost to the economy of using the resources to achieve energy conservation. Even if the resources would otherwise be employed, it is important to value the use of the resources on the basis of the alternative use, which may be a lower value than the use in achieving conservation. As we indicated in the discussion of valuation of benefits, accurate estimation of resource cost according to these principles can be a very difficult task.

The Effect of Taxes

Special attention must be given to the effect of taxes on the private-sector evaluation of energy conservation projects. As noted above, the public-sector analysis should ignore the presence of taxes either as a cost or benefit. The reason for not considering taxes in the public-sector analysis is that taxes

generally do not represent a payment for the consumption of a productive resource, although there may be exceptions if taxes are actually user-fees that serve to allocate a scarce resource. However, in a private-sector analysis, taxes have a very real effect on the cash flow of a project and thus must be taken into account. Depending on whether taxes have a net subsidy or cost effect, the impact of taxes will be to improve or worsen the apparent financial performance of a project from the private-sector perspective.

Valuing Benefits and Costs Over Time

A conservation project will typically involve capital outlays at project inception and will return energy savings benefits over a period of several years. The usual method for cumulatively valuing costs and benefits that do not occur in a single time period is **discounted present value analysis.** To use a discounted present value analysis procedure requires a discount rate. For the private enterprise, the appropriate discount rate will usually be the marginal cost of capital to the enterprise. The marginal cost of capital will be based on the borrowing cost of the enterprise and the required return on equity investment by the owners of the enterprise. These values will usually be adjusted to reflect the tax treatment of the interest costs of borrowing and the equity income received by an enterprise.

The evaluation of a project from the public policy perspective will also require a discount rate. However, the appropriate public discount rate most often will differ from that used by a private enterprise. The discount rate used by a public policy analyst should reflect the cost to the economy of deferring current consumption to create savings and achieve increased future production and consumption, or -- if the capital will not be generated from domestic savings -- the cost of borrowing imported capital. Also, the public policy discount rate will include no tax effects. With these differences, the discount rate for a public policy analysis will often be less than the rate used by an enterprise. As an example of the implications of this difference, by using a lower discount rate, the public policy analyst will be more likely to prefer projects that have higher front-end costs or a lower, but longer-lived, stream of benefits than would the private enterprise.

Other Considerations

In addition to the differences in the methods of valuing the benefits and costs of an energy conservation project, there are other considerations that may affect the public policy analyst's conclusions regarding the desirability of a conservation project. These considerations would not usually be considered by the private enterprise in deciding whether or not to undertake a conservation project. considerations include:

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1. National security benefits
2. Environmental costs and benefits
3. Foreign exchange effects, and
4. Development of domestic labor and capital resources.

For some economies, the national security benefits from reducing consumption of imported energy resources may represent important external benefits from a conservation project. By external benefits (and costs), we mean benefits (or costs) that result from the reduced consumption of the energy resource but that are not normally accounted for in market transactions involving the energy resource or in transactions involving the goods and services that use the energy resource as a production input. Countries that rely to a large degree on imported energy may suffer a risk of supply disruption and/or price increases that, if they occur, could prove very costly to the economy in terms of lost production and income. Reducing the reliance on energy imports through conservation projects may lower these risks and yield an additional benefit that may be accounted for (at least qualitatively) in valuing the benefits of a conservation project or program.

Environmental benefits or costs represent a second externality that may influence the evaluation of a conservation project from the public policy perspective. Environmental benefits may result from energy conservation if, for example, the increase in energy use efficiency is accompanied by less air pollution or less use of scarce forest resources for firewood. In some situations, such benefits or costs could have substantial importance in evaluating the merits of a proposed conservation program.

The third additional consideration, foreign exchange effects, may be of major importance in economies that have a relatively small export base but import a large share of their energy requirements. The foreign exchange effects of a conservation program should be beneficial if the conservation results in fewer imports of energy resources and does not require large imports of capital resources or other material for undertaking the conservation project. With fewer imports and reduced demand for foreign currencies, the country may be able to improve its terms of trade with other economies. As a result, less of the nation's production and income would have to be exported to import a given amount of goods and services. Of course, if a conservation program will involve major use of imported capital resources and material, the project may have negative foreign exchange implications.

As the final additional consideration, we note that a conservation project may be favored or opposed because of its implications for the development of local labor, capital, and other productive resources. If a project may be

expected to contribute to the improvement of labor skills, assist in the formation of a new industry with export potential, or promote higher employment in a weak economy, these benefits may significantly exceed those that would be determined from the valuation of energy savings alone.

TRADITIONAL APPROACHES TO FINANCING CONSERVATION INVESTMENTS

Once the management of an enterprise has decided to undertake a conservation project, it must decide how to pay for the project. The problem of paying for, or financing, a conservation project is perhaps the most important obstacle to realizing the economic and financial benefits of conservation investment opportunities. Generally speaking, there are two "traditional" approaches to financing industrial investments: corporate financing and project financing. These approaches may also be used for financing conservation projects. However, specific characteristics of conservation investments and management's attitude about them may frustrate the application of these traditional financing techniques. In the following sections, we review the use of traditional methods for financing conservation investments and highlight some of the issues associated with their use for conservation projects.

Corporate Financing of Energy Conservation Projects

Corporate financing is the most commonly used approach to acquiring the funds for undertaking a corporate industrial investment and is distinguished from project financing by its reliance on the corporate assets of the firm as the security for the financing. That is, in seeking to obtain funds for a project through corporate financing, the firm will not isolate the investment project as the reason for acquiring the funds or as the basis for expecting a return on the invested funds. Rather, the capital is acquired on the basis of the firm's overall financial condition which will reflect such considerations as: the level of its assets and liabilities, the outlook for profitability, the extent to which liabilities must be paid soon, and the amount of assets that could quickly be converted to cash to meet unforeseen business expenses or revenue shortfalls.

The funds obtained by corporate financing may be classified as equity or debt. In deciding whether and how to use these financial resources for a conservation project, management must consider the cost of the funds and the extent to which using the corporate financial resources may impair the firm's ability to acquire additional capital funds for other projects in the future.

Equity financing represents ownership of the assets of a corporation. The equity-holders of a corporation are not guaranteed a repayment stream and receive a return on their investment only to the extent that the corporation can meet all other financial obligations and have something left over for the equity holders. The equity financing funds for an investment may be obtained from a new stock issue, retained earnings, or other internal cash sources such as depreciation. The use of retained earnings or internal cash sources for acquiring equity funds is equivalent to issuing new stock because, if not used for internal investment purposes, these funds could be disbursed to existing shareholders as dividends.

Debt financing represents a contract by the corporation to repay the providers of debt capital both the principal amount of the lent funds and a fixed return (interest) for the use of the funds. Unlike the providers of equity financing, providers of debt will retain specific rights to the assets of the corporation as security for the lent funds. That is, if the corporation is unable to repay its debt and interest according to the agreed schedule, then the creditor may receive its payment from the assets of the corporation. In addition, creditors may place other requirements, or covenants, on borrowers as a condition of the debt contract. For example, these covenants may require that the borrower maintain a specified amount of cash or near-cash securities as a reserve for making debt payments; or may prevent the corporation from paying dividends unless its operating revenues exceed debt payments by a specified margin. Debt may be provided through the issuance of bonds in public capital markets, through specified term loans with banks and other creditor organizations, or through revolving credit facilities, which set aside an amount of debt funds that may be used by the corporation, usually to meet short-term financing needs.

Traditional equity and debt financing each have their own advantages and disadvantages for use in acquiring funds for conservation projects:

- Equity financing is generally more expensive than debt financing because of the higher risk accepted by the equity owners of the firm. In return for accepting more risk than is accepted by creditors, equity owners will require a higher expected return than the interest cost of debt. In addition, under most tax codes, interest payments on debt are treated as a cost of business and are thus able to be deducted from income in computing tax liability. These two considerations will usually argue for the use of debt in preference to equity as a source of incremental financing funds.

- However, debt financing may expose the corporation and its equity holders to greater uncertainty of financial performance and risk of bankruptcy. Although debt financing is generally less expensive than equity, debt increases the variability of shareholder returns

because it entails fixed repayment obligations. In addition, the higher the debt repayment burden relative to the expected operating income from which to make debt payments, the higher will be the likelihood that the firm will not be able to meet its obligations and, consequently, be forced into bankruptcy.

- The use of either form of financing may reduce management's prerogatives in managing the firm's business. As already stated, debt agreements often contain restrictive covenants that may limit subsequent financing activities. In addition, issuing new equity may dilute the ownership prerogatives of existing equity holders and, in the extreme, may expose a firm to being controlled by a board of directors whose interests differ from those of current shareholders. Management may be reluctant to accept these costs to finance conservation projects that are not the central focus of the firm's business activities.

- Using either form of financing may limit the firm's future financing capabilities. At any time, the firm has limited financing ability. This financing ability will be determined by the existing debt/equity structure, the outlook for financial performance, and the liquidity of the firm's assets. When the firm uses some of this financial resource for a conservation project, it reduces its ability to use that resource in the future or at least increases the cost of its use. Again, management may be reluctant to use this resource to finance investments that do not involve the firm's primary business activities.

In sum, management must decide whether the benefits from conservation projects exceed the costs of using the firm's limited corporate financial resources, and whether to use the financial resources for energy conservation projects or to conserve them for some other use. Because energy conservation is not usually the focus of a firm's business activities, management will often decide that corporate financial resources should not be allocated to conservation investments.

Project Financing of Energy Conservation Projects

Because management is frequently reluctant to use its corporate financial resources to undertake conservation projects, project financing may offer an attractive alternative for obtaining the needed capital funds. Like corporate financing, project financing will involve a combination of equity and debt. Equity is again provided by the project developer and must come from one of the sources mentioned above (e.g., new stock issue). However, in contrast to corporate financing, project financing consists of isolating a project from

the general asset structure and business activity of a firm and securing debt financing on the basis of the asset value and expected cash flow stream of the independent project.

Relative to corporate financing, the project financing approach presents advantages to the firm, including:

- The project debt will usually not be recorded as a liability on the corporate balance sheet. Thus, the firm's corporate financing ability should not be impaired by the financing of the conservation project.

- Generally speaking, more of the debt repayment risk is shifted to the lender than would be the case if the debt were secured by the general corporate assets. In the event that the borrower defaults on project-secured debt, the creditor's recourse is limited to the assets of the project (or any other security pledged for the loan) instead of the general corporate assets. This type of arrangement is often called a partial- or limited-recourse loan.

These advantages are partially offset by the cost of a project financing loan, both as interest and origination expense, which is usually higher than for conventional corporate financing loans. The higher cost results from the typically greater default risk absorbed by the creditor and the more detailed project evaluation required to verify the adequacy of project cash flow to cover debt payments. Despite these higher costs, management will often prefer to use the project financing approach for undertaking conservation and other discrete industrial projects.

Although project financing offers management an attractive source of funds for undertaking conservation projects, creditors may be reluctant to provide project-secured financing for conservation projects. Several reasons account for this reluctance, including:

- Conservation projects may not provide the level of asset security desired by creditors for limited recourse lending. Conservation projects often involve customized engineering and the installation of equipment and materials that would have little salvage value. As a result, creditors may see little or no asset security for a loan.

- It is difficult to isolate a revenue stream that can be used for repaying the project debt. The financial analysis of a conservation project may show substantial cash flow for servicing project debt. However, because the cash flow shows up as a reduction in operating costs, creditors will have difficulty in "setting aside" the revenue stream (e.g., through debt covenants) as the basis for

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securing debt repayment. As a result, even though the financial analysis shows that the project cash flow should be more than adequate to repay the loan, creditors may be uncomfortable with the debt financing.

- Creditors are likely to be unfamiliar with the technological and economic performance factors involved in assessing the expected performance of a conservation project. Conservation projects often involve sophisticated technologies or equipment that will be unfamiliar to a creditor. In addition, creditors will not likely be familiar with the energy market considerations that may influence the financial performance of a conservation project. As a result of their unfamiliarity with project technology and economics, creditors may be reluctant to provide loans for financially sound conservation projects. This likelihood is often an artifact of the way banks and other financial institutions organize relationships between credit officers and the borrowing clientele. That is, credit officers typically specialize in a few business areas and are assigned to a client based on the client's business. Thus, a creditor is usually familiar with the client's basic business but may know nothing about conservation technology and energy economics.

As a result of these problems, creditors often try to blend the principles of project and corporate financing as they negotiate loans for conservation projects. Specifically, creditors may require that a conservation project developer pledge some additional asset as security for a loan. In this way, management may still be able to realize some of the benefits of a project financing: the creditor's recourse will be limited and, in some circumstances, the liability may be kept off the balance sheet. But, of course, management will also lose the flexibility of using the pledged asset as security for any other financing.

GOVERNMENT POLICIES TO PROMOTE PRIVATE INVESTMENT

In view of the potential divergence between public and private sector evaluation of conservation projects and the problems that may confront management in their attempts to finance projects through traditional channels, it is often necessary for the public sector to provide some form of financial assistance or incentive to promote private investments in conservation projects. Incentives that have been used by governments to promote investment in conservation include:

- Grants/cost sharing for technology demonstration
- Grants/no-risk loans for audits and preliminary engineering studies

- Subsidized interest loans
- Revolving credit funds
- Tax-related incentives
- Purchase of energy savings
- Exemption of conservation-related imports from tariffs
- Loan guarantees
- Insurance programs for project technical performance.

Grants/Cost Sharing For Technology Demonstration

Technology demonstration is often perceived as highly risky in a developing country even though a conservation technology may have been successfully applied and widely accepted in developed countries. For this reason, it is often necessary for the government to pay all or a substantial share of the cost of installing a conservation technology for the first time application in a country. In a typical grant/cost sharing program for technology demonstration, the government will establish criteria for project support, such as:

- Being the first of its kind in a country
- Having a substantial opportunity for replication throughout the country
- Possessing significant energy savings potential both in the individual application and in replication at other sites
- Having the likelihood of being financially beneficial to companies that may subsequently use the technology.

Firms may then submit applications for project support. In some instances, the government may advertise for firms to submit applications for the demonstration of a specific technology which it wishes to introduce to the country. The typical share of a project's cost that might be born by the government could range from 25 percent to as high as 80 percent, depending upon the degree of risk assessed for a project. Very often, the grant will be specifically for the foreign exchange component of a project.

A demonstration grant program is generally very effective in introducing new technologies to a country because it directly offsets the capital outlay burden

that must be born by a company as it undertakes a conservation project and, accordingly, eliminates the risk of capital loss (for the share of cost borne by the government). Needless to say, the expected financial performance of a project should also be improved by a grant. The greatest problems of a grant/cost sharing program are the cost -- the government may have substantial cash outlays; the administrative difficulties of establishing and managing a grant program; and the difficulty of evaluating assistance proposals -- it is difficult to apply evaluation criteria in a systematic, objective fashion.

Grants/No-Risk Loans For Audits And Preliminary Engineering Studies

Although the outlay for audits and preliminary engineering studies will generally be the least expensive part of an energy efficiency improvement project, it is typically the highest uncertainty/highest risk outlay that occurs as part of a project: the least is known at this point about the value that may ultimately result from a conservation project. As a result, companies are often reluctant to commit the money for audits and preliminary engineering studies even though the cash outlay may be comparatively small. To overcome this aversion to risk, governments have provided grants or no-risk loans for audits and preliminary engineering work on conservation improvements. The no-risk feature of a loan means that the company is only obligated to repay the loan if the audit/engineering studies identify conservation opportunities that meet specified financial criteria. The loans for some programs have been interest-free or at below-market rates.

To implement such a program requires:

- Developing guidelines on the types of audit/engineering studies that will be eligible for financial assistance and application procedures
- Establishing a ceiling on the amount of financial assistance available for individual studies
- Identifying approved audit/engineering study organizations
- Advertising and administering the audit assistance program.

Financial assistance programs for audit/engineering studies have been successfully implemented in several developed and developing countries. In most instances, the programs have resulted in the installation of energy efficiency improvements that would otherwise have not been identified. In this regard, the programs are highly effective in leveraging a relatively small amount of government funds to encourage a substantial capital outlay in socially beneficial energy efficiency improvements. The most important

problem in implementing a financial assistance program for audit/engineering studies is the administrative burden.

Subsidized Interest Loans

In cases where the return on energy efficiency investments is not adequate to attract private capital, it will be necessary to provide some form of subsidy to promote conservation project development. One form of subsidy that has been used in developing and developed countries is the provision of subsidized interest loans. This incentive arrangement may be structured in several ways:

- Government may lend money directly at below-market rates to energy users for qualified projects
- Government may deposit money in financial institutions which is targeted for lending for qualified energy projects. Government would accept a return on its deposit that is less than the financial institutions' normal cost of funds; as a result, the financial institutions would be able to lend at below-market rates and still earn an adequate margin on the energy project lending
- Government may "buy down" the interest rate on loans from financial institutions through a one-time payment or series of payments over the life of a loan. In this case, financial institutions would use their own capital to lend for qualified energy projects. Government's sharing in the interest cost permits the institutions to lend at below-market rates.

Regardless of the way the program operates, the effect is the same: energy users are able to obtain credit for energy efficiency improvements at a lower cost-of-capital than would be obtained if they borrowed from financial institutions at conventional market rates. As a result, the expected financial performance of projects should be improved and energy users should be more willing to undertake them. In addition, government's intervention in the lending process draws attention to the need for energy project funding and may increase the willingness of financial institutions to lend for energy efficiency improvements.

As part of a subsidized financing program, governments have sometimes coupled more lenient repayment terms with subsidized interest loans. For example, to prevent negative cash flow at project start-up, an energy user may be allowed a principal moratorium period at the beginning of a project's operation. Another feature would be to allow a longer repayment term so that the payments in any period will be more likely to be less than the value

of energy savings in the period. Both features would improve the ability of the energy user to meet his debt payments on schedule and reduce energy users' aversion to borrowing for energy efficiency improvements.

Implementing a subsidized interest lending program involves the following steps:

- Developing guidelines on the types of projects that will qualify for subsidized financing; in some cases, programs have used a "needs" test to validate that the expected private return on a project is indeed so low as to preclude unassisted private financing
- Establishing the network that will process loan applications and administer the loans; again, as we mentioned above, this network has often involved existing financial institutions. The advantages of using an existing infrastructure are that a qualified lending staff is already present; the program can be more decentralized and thus process applications for small loans more efficiently; the program start-up will be less administratively burdensome and costly to the government and will occur more swiftly
- Advertising and initiating the program
- Disbursing the funds either as loans, deposits at financial institutions, or interest subsidy payments.

Subsidized loan programs have been used in several countries with varying degrees of success. The principal weakness of a subsidized loan program is simply that the level of subsidy provided is not very great. That is, the capital cost of the project itself is not reduced; rather, only the financing cost is reduced. Nevertheless, for marginal projects, this level of subsidy may be adequate to promote development. In addition, subsidized loan programs have a psychological impact on both lenders and energy users: the programs highlight the importance of conservation project development and accentuate the need to flow capital into energy efficiency improvements.

Revolving Credit Funds

One method of managing the funds to be lent in a subsidized financing program is through a revolving credit fund. In a revolving credit fund, the government would establish a pool of funds that are reserved for financing qualified energy projects. The funds may be domestic currency or foreign exchange credits, which are important for financing energy efficiency improvements because of the typically high foreign currency content of the investments. The principal objective of establishing a revolving credit fund is

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to provide a protected reserve for energy project financing that cannot be appropriated for other purposes.

Often, a revolving credit fund may be funded by a special tax on energy consumption or energy imports. In the case of a fund for foreign exchange credits, a government may be able to establish a special line of credit with an international lending institution such as the World Bank or the International Monetary Fund. The justification for such an arrangement would be that the investments in energy efficiency improvements will benefit the overall economic and financial well-being of a country and enhance its ability to meet other international financial obligations.

The money in the revolving credit fund would be managed in the same way as the cash assets of any financial institution. Funds would be lent for qualified projects either directly by the government or through existing financial institutions. As loans are repaid or as additional funds come available through accruals to the fund, additional loans could be made.

Tax-Related Incentives

The use of tax-related incentives is another approach for subsidizing energy efficiency investments and overcoming a differential between social and private rates-of-return. Tax-related incentives include special tax credits based on the cost of energy conservation equipment and accelerated depreciation schedules for conservation equipment. These incentives reduce the taxes that would otherwise have to be paid by an energy user that has installed an energy efficiency improvement. As a result, the implicit capital cost of conservation projects is reduced and the expected return will be higher.

Tax-related incentives function as part of the tax code of a country and, accordingly, will only be effective to the extent that the basic tax code is enforced and complied with. In addition, another limitation on the effectiveness of tax-related incentives is that, in their traditional design, they will benefit only companies that have substantial tax liability. That is, the subsidy occurs through the reduction of taxes that would otherwise have to be paid; if a company has no tax liability, then it will not benefit from the incentive. One way of avoiding this weakness is for governments to grant cash rebates for the value of tax benefits that would otherwise not be received because of low tax liability. Alternatively, companies may engage in leases or other financing arrangements that transfer ownership of the conservation equipment, and its associated tax benefits, to an external investor who has a high tax liability.

Tax-related incentives have the advantage of not requiring active administration by the government. That is, government does not have to review and make individual decisions on applications for the incentive. However, this feature also increases the likelihood that tax-related incentives will be used fraudulently or for applications that require no subsidy. Indeed, the chief criticism levied against the 10 percent Energy Investment Tax Credit that existed in the United States between 1978 and 1983, is that it was generally used for projects that would have gone forward without the tax credit. As a result, the tax credit proved to be a costly means of promoting energy efficiency investments.

Implementing tax-related incentives requires modification of a country's tax code and thus will usually involve legislative action. After the development and passage of the legislation authorizing tax-related incentives, rules for the incentive must be prepared and its availability must be advertised.

Purchase Of Energy Savings

Another form of subsidy which has been used in some countries is the purchase of energy savings. In its usual form, this incentive is a grant or cost-sharing arrangement in which the amount of subsidy is based on the expected value of energy savings from a project. Under this incentive, government agrees to pay a specified value per unit of energy that is expected to be saved over the operating life of a project. In computing the total amount to be paid as subsidy, the government will usually discount the value of savings over time. In addition, government may limit the subsidy amount to a maximum percentage (e.g., 80 percent) of the capital cost of an energy efficiency improvement. The value paid per unit of energy saved should be based on the estimated differential between the social and private values of energy consumption/conservation. For example, if an oil importing country subsidizes domestic oil consumption, then the unit energy savings payment for oil-conserving projects might be some fraction of the difference between the international market and domestic posted prices for oil.

This incentive has been used effectively in the United States to promote investment in projects that are designed to save electricity. Electricity conservation is frequently a good target for such incentives because, in most countries, the long-run cost of supplying electricity (including the cost of new generating capacity) is greater than the current price.

Depending on the value of the unit energy savings payment, energy users may be strongly encouraged by this incentive to install energy efficiency improvements. The incentive both reduces the financing requirement for a conservation project and improves the project's expected return. The chief drawbacks of the incentive are its large administrative requirements and cost.

Implementing a purchase of energy savings program involves:

- Establishing criteria for qualifying projects and procedures for projecting and valuing energy savings
- Developing the bureaucracy required to administer the program
- Identifying qualified organizations to audit energy user facilities and develop estimates of the expected energy savings from conservation projects
- Advertising and implementing the program.

In operation of the program, a company would submit an application for project assistance which includes certified estimates by a qualified energy engineering firm of the energy savings that could be anticipated over the life of a project and the installation cost of the project. If the project meets program criteria, then government issues a commitment to pay a specified value for purchasing the expected energy savings from the project. This commitment should be able to be used as a basis for acquiring construction financing for the conservation project. Usually, this payment is made in a lump sum at the completion of the project; however, in some programs, the payment may be made in installments over a several year period, with each payment after the first being subject to proof that the project has been adequately maintained and continues to be used. The latter arrangement increases the likelihood that a project will achieve the projected energy savings but reduces the incentive's effectiveness in assisting project financing.

Exemption Of Conservation-Related Imports From Tariffs

Conservation projects in developing countries frequently have high foreign currency content (e.g., 80 percent or more) because of the need to purchase specialized equipment and engineering services from abroad. The subjection of equipment imports to tariffs can only reduce the expected financial performance of projects and make them less likely to be financed. At the same time, those projects which reduce consumption of an imported fuel reduce the need for foreign currency purchases in the country and will typically have high foreign currency returns. Recognizing that conservation projects will often yield, over the longer term, a national economic benefit from improving the balance of trade, some countries have eliminated duties and tariffs on the import of equipment to be used in conserving energy.

The extent to which this measure will improve project financial performance and result in greater installation of conservation improvements will depend on the reduction in the tariff/duty burden. If equipment imports are subject to

low tariff rates to begin with, then reducing or eliminating the tariffs will have little effect on project performance. However, in some countries, the tariff levels are as high as 50 to 100 percent of the equipment purchase cost and elimination or substantial reduction of such high tariffs would have an important effect on expected financial performance.

Although this program will result in a loss in public sector revenues, it is relatively easy to implement and, depending on tariff levels, can be effective in spurring capital flow into conservation investments. Implementation involves developing the criteria for qualifying equipment imports and making these criteria part of the regular tariff schedule. Use of differential tariff rates on the basis of proposed end use does raise the problem of importers trying to use the preferential rates for equipment that will be used for some purpose other than improving energy efficiency.

Loan Guarantees

Because of the perception by financial institutions of a high level of risk and uncertainty for many conservation projects, governments may need to share in the risk of capital loss to encourage financial institutions to lend for energy efficiency improvements. One way of reducing the risk to private sector creditors is through a loan guarantee program. In a loan guarantee program, the government serves as guarantor on loans for qualified conservation projects. Qualifying loans will typically be for a fairly high percentage (e.g., 80 percent) of a project's capital cost. Further, the government will typically guarantee a fairly high percentage (e.g., 80-90 percent) of the loan.

As the result of the government's guarantee, financial institutions should be willing to lend for projects or to organizations that would not otherwise have met the traditional lending criteria. Energy users may thus acquire the upfront cash needed to install a project and will not have to obligate other assets (as is often the case in lending for energy efficiency improvements) to secure a loan. In addition, financial institutions may be willing to lend at slightly below-market interest rates because of the security provided by the government's guarantee. The interest rate differential would benefit the financial performance of a conservation project.

Implementing a loan guarantee program involves:

- Developing criteria for qualifying projects and creditor and borrowing organizations. Both the projects and borrowing organizations must represent reasonable risks. The government should not support financing for projects that lack a reasonable expectation of financial success or for organizations that cannot be expected to be financially responsible in meeting debt repayment

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obligations. Creditor organizations may also have to be qualified for participation in the loan program since they will be placing the government's assets at risk in administering the loan guarantee program.

- Specifying the fraction of a project's capital cost and loan amount that will be eligible for loan guarantee support. Providing a loan (and loan guarantee) for less than the full cost of a project ensures prudence on the part of energy user in managing an energy project: the energy user should have at least a small cash stake in the project. Also, to ensure that financial institutions are prudent in the processing and recommendations for approval of loan applications, the government may back less than the full amount of the loan (say 80-90 percent).

- Determining whether to charge an insurance premium and, if so, the amount. The government should at least charge a nominal premium to cover its administrative costs. If the program became well-established and had a stable and not unduly high level of guarantee claims, government could develop an actuarially based insurance fee for the guarantee or could turn the program over to a private insurance firm (or firms).

- Gaining the cooperation of financial institutions and publishing guidelines for use by institutions in evaluating loan applications.

Once the program is in place, energy users will submit loan guarantee applications through the financial institutions that have been qualified to participate in the loan guarantee program. Government will receive processed applications from financial institutions and, for satisfactory projects, provide its guarantee.

Loan guarantees are most effective in circumstances in which conservation projects may be expected to achieve reasonable financial returns but, for which, lenders are reluctant to extend credit because of unfamiliarity with conservation projects or concern for the financial stability of borrowing organizations. Loan guarantees provide little, if any, subsidy and thus cannot be expected to promote development of marginal projects. As a result, to be effective in promoting the flow of capital into conservation investments, loan guarantees must sometimes be coupled with a subsidy incentive.

If used in the appropriate circumstances and properly managed, a loan guarantee program can effectively promote investment in energy efficiency improvements and yet have relatively little cost to the government. The reason that a loan guarantee program can be operated at a low cost relative to its effect is that the government does not actually spend money for

conservation investments unless a the loan for a project is defaulted on by the energy user. Thus, if the criteria for project approval are carefully constructed and the program is judiciously managed, the government may spend little money while having a substantial effect in encouraging conservation investments. If a loan is defaulted, the government will gain title to the equipment installed with the loan.

Insurance Programs For Project Technical Performance

Another method for reducing the uncertainty/risk problems that deter the flow of capital into energy efficiency improvements is for government to provide or promote the development of a technical performance insurance program. For a premium, the insurer would guarantee that a project would meet specified efficiency standards with regard to energy conservation. If the project failed to perform to specifications, the insurer would bring the project up to the guaranteed operating specifications or compensate the energy user for the loss in value of energy savings resulting from the sub-specification performance of the project.

As a result of such a program, energy users and creditors should have less concern for the technical uncertainties associated with conservation project performance. With this source of risk eliminated, energy users should be more willing to undertake conservation projects and creditors more willing to finance them. Such insurance programs do not normally cover the risks resulting from uncertainty over energy prices or uncertainty about the rate of utilization of the energy efficiency improvement. However, such risks could be included in an insurance contract. For example, use of future delivery contracts for energy products could provide a basis for insuring against losses in the value of energy savings that result from lower-than-expected energy prices.

Governments could form a performance insurance program for conservation projects or could work with existing private sector insurers to develop such a program. If government undertook the program on its own, it would need to set aside the initial financial reserve to cover potential claims; establish procedures for evaluating projects, setting insurance premiums, and settling claims; and develop the insurance organization. Subsequently, it would advertise and operate the program. If government worked with private insurers to develop a performance insurance program, it would need to provide some form of financial incentive (e.g., a special tax benefit for participating companies) or co-insurance to entice private firms to enter the performance insurance market.

Like the loan guarantee program, a performance insurance program could be operated at little net cost to the government. The level of cost to government will depend upon the extent to which government decides or needs to operate the insurance program as a subsidized activity (i.e., the premiums charged would be less than the expected loss on a project). If the government developed the insurance program on its own, the administrative costs would be high.

Considerations in Designing a Comprehensive Financial Assistance Program

Implementing a financial assistance program to promote the flow of capital into energy efficiency investments will often require use of several of the incentive mechanisms discussed above. The choice of mechanisms will depend on the specific set of factors that is important in limiting the willingness and ability of companies to finance energy conservation projects and the financial/institutional setting in the country.

With regard to the factors that limit companies' willingness and ability to finance conservation projects, the government should attempt to determine the relative importance of three categories of factors:

- Insufficient flow of capital and foreign exchange into conservation investments (even though such investments appear to have adequate returns to support private sector financing)
- Lack of adequate financial return to encourage company support
- A perception (whether warranted or not) by energy users and creditors of high uncertainty and risk for conservation projects.

If the first category of factors is important, which is more likely in countries in which the financial sector is not accustomed to dealing with conservation projects, it may be necessary for the government to implement mechanisms such as the first four discussed above. These mechanisms include:

- Grants/cost sharing for technology demonstration
- Grants/no-risk loans for audits and preliminary engineering studies
- Subsidized interest loans
- Revolving credit funds.

The second factor, lack of adequate financial return to encourage company support, is more likely to be important in countries that subsidize energy prices, tax returns on capital heavily, or have high borrowing costs. In this case, the government may need to implement one or more subsidy mechanisms, which include:

- Subsidized interest loans
- Tax-related incentives
- Purchase of energy savings
- Exemption of conservation-related imports from tariffs.

Of course, if tax-related incentives cannot be effectively included in the tax code or if the tariffs on conservation-related imports are already low, then these mechanisms will not be effective.

Finally, if the third category of factors, a perception by energy users and creditors of high uncertainty and risk for conservation projects, is an important deterrent to conservation project financing, then government may need to implement one or more of the following mechanisms:

- Grants/cost sharing for technology demonstration
- Grants/no-risk loans for audits and preliminary engineering studies
- Loan guarantees
- Insurance programs for project technical performance.

In practice, it will often be necessary to implement a package of incentives.