BUSINESS FOCUS SERIES:

STRATEGIES FOR FINANCING ENERGY EFFICIENCY

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Executive Summary

Throughout the world market barriers to energy efficiency are disappearing and the institutional capabilities to implement energy efficiency are increasing. Yet financing for energy efficiency still faces numerous challenges. Financiers will not be interested in energy efficiency until there is a sufficient volume of projects with attractive returns that require financing. Conversely, project development is stymied by the lack of confidence that adequate financing will be available and the absence of knowledge of how to identify and structure a bankable project. This report defines strategies and recommends actions for obtaining financing for energy efficiency investments. The report is based upon recognition that successful financing strategies must address the following challenges:

- finding favorable market opportunities for energy efficiency
- involving partners that have a strong economic incentive to act
- developing projects with attractive returns, and
- applying appropriate financial structures.

The report targets primarily policy makers and financial institutions that are actively seeking new or expanded roles in energy efficiency financing. However, it is hoped that all stakeholders will find the report meaningful. It is well known that some of the most significant benefits of energy efficiency are environmental benefits that accrue to society as a whole. Yet over the foreseeable future, the private sector represents the larger source of investment. This means that new relationships between public and private stakeholders are necessary to close the gap between policy imperatives and private sector objectives.

The strategies recommended in the report are a combination of financing, market development and policy initiatives. Many of the financing strategies are designed to increase the participation of various stakeholders, most notably commercial credit providers, equipment vendors, and utilities. The fact that energy efficiency is not really a distinct market is also reflected in the recommendations. In the case of energy efficiency, market fragmentation requires the application of a range of financing models and use of standardization where possible. Standardization of contracts and finance agreements, introduction of measurement and verification protocols, and certification of equipment and service providers can serve as a way to provide a level of uniformity to an otherwise fragmented market. Other strategies recommend the development of new financing mechanisms, arranging financial support for project development and developers (such as energy service companies) and commitment to the long-term development of future financing mechanisms, such as creating global carbon markets. Each of the recommended strategies, along with illustrative examples, is described below:

Aggregate Groups of End-users by Type and Locate Financing. Strategies that aggregate the market by type of end-user or type of investment are a valuable way to address critical issues common to groups of energy consumers such as end-user creditworthiness, the small size of the investment, and the lack of collateral value. End-users can be aggregated by type of

institution (municipality, industrial, institutional, or agricultural) to take advantage of the similarities in end-user credits.

Larger amounts of capital may be made available by aggregating projects into programs, such as a financing program to install thousands of energy-efficient motors throughout a country, a loan from a multilateral development bank that allows all of the municipal water utilities in a nation to retrofit their water pumping stations, or the mass production of metering devices that could be installed in unmetered customer facilities on a cost-effective basis. Where programs and projects can be aggregated to reach amounts between $1 million and $50 million, financing can be more readily obtained from local and international financial institutions.

Increase the Participation of Commercial Credit Providers. Commercial credit is a logical source of financing for energy efficiency. Leasing and term loans lend themselves well to energy efficiency projects. In the United States, commercial credits, including leasing, are the largest source of financing for energy efficiency, but in developing countries few financial institutions are involved. In many instances, local commercial banks are unaware of the potential market for energy efficiency loans. The report identifies other valuable roles that local financial institutions can adopt in instances where they do not have capital to lend from their own resources — acting as financial intermediaries with international institutions, as guarantors, as fund administrators, or as experts in local business conditions and customer credit.

Obtain Funding for ESCOs. Energy service companies (ESCOs) adopt multiple roles in energy efficiency projects — as marketers, project developers, project engineers, operators, guarantors of performance, and arrangers of financing. The number of ESCOs operating outside the United States, while small, is growing.

The presence of an ESCO industry in a country provides developmental impacts that extend beyond the energy savings realized from the specific projects the ESCOs develop. Many ESCOs need equity financing for marketing and project development as well as access to debt financing for their customers. ESCOs in search of equity financing should consider new strategic alliances and venture capital. The Bulovka Hospital project in the Czech Republic is a good example of an energy efficiency project involving a partnership between an ESCO and an equipment vendor.

Increase the Amount of Vendor Financing Available. Marketing programs that target high levels of market penetration with common, easily replicable end-use applications lend themselves well to vendor financing programs. Equipment vendors with market reach are good candidates for vendor programs. The objectives of the vendor/financier partnership are to enhance the security structure (to allow credit to be extended to more customers), to manage the costs of multiple transactions, and to create a higher volume of business for both parties. The credit structure is strengthened by including some recourse to the vendor through reserve funds, holdbacks, first-loss provisions or partial financing. An example of innovative vendor financing in India is highlighted in the report: a manufacturer of power factor correction devices obtained financing so that it could provide lease financing for several hundred devices installed in textile mills. In this example recourse to the vendor was through an extended equipment

warranty, under which lease payments were suspended whenever the equipment malfunctioned.

Promote Utility Involvement in Energy Efficiency Financing. Electric utilities can be powerful players in energy efficiency. Utilities, by implementing demand-side management programs, can avoid new capital investments, provide cost savings for end-users, and create market pull for vendors and service companies. Utilities don't necessarily need to finance all of the costs of a demand-side management program. One method for sharing costs is the establishment of a utility-administered credit program for their energy customers. Here, the utility can assume several roles — as facilitator, financial services provider, collection agent, or payor/buyer. In Mexico, the Proyecto de Uso Racional de Iluminación en Mexico, or Ilumex, is an example of a utility selling compact fluorescent lighting to residential customers with payment made over time and collected through customers' electricity bills. The report discusses the key issues to consider in the design of utility financing programs, but also stresses that the key to motivating utilities to implement energy efficiency programs of any kind is to have incentives (market-based or regulatory) where the benefits are clearly apparent.

Establish Country- and Region-Specific Energy Efficiency Funds. The development of special-purpose funds can be a good financing strategy provided the funds are structured and managed well, sufficiently planned, and targeted to where market demand is known. Funds are a good way to blend both private and public sector sources of financing, as well as to lower the overall cost of financing. Many of the funds that have been developed contain some government subsidies, frequently in the form of subsidized interest rates. Two examples of successful energy efficiency funds are the Magyar Hitel Bank energy efficiency fund in Hungary and the KEMCO fund for energy efficiency in Korea.

Develop Financing Mechanisms for the 21st Century. Three types of innovative financing mechanisms are discussed in this report: emissions credits through joint implementation, linking energy efficiency financing to independent power project financing, and tapping into secondary markets to access new sources of financing. There are potentially many other innovative financing mechanisms and efforts to test these mechanisms must be made.
The Decin Project in the Czech Republic that converted a coal burning district heating plant to natural gas is an example of an activity implemented jointly whereby three U.S. utility companies agreed to provide financing in exchange for future emissions credits.

The report concludes with recommended actions for each type of stakeholder. It recommends that bilateral donor agencies take a lead role in keeping the topic of energy efficiency financing on the policy agenda. Local government agencies must actively support policies that create favorable market conditions and provide incentives for private sector development of the energy efficiency market. Multilateral development banks and electric utilities, many of whom have long-standing relationships, are urged to work together to implement utility incentives for energy efficiency, to develop new loans for energy efficiency and to find ways to leverage utility-financed programs with private sources of financing. Lastly, it is recommended that all types of financial institutions - commercial banks, export credit agencies, international financing agencies, and leasing companies learn about energy efficiency investments by becoming active participants in the market.

- United States Agency for International Development
- Bureau for Global Programs, Field Support, and Research
- Center for Environment
- Office of Energy, Environment, and Technology

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The Office of Energy, Environment, and Technology is a part of the Center for Environment and helps developing countries and emerging economies find market-oriented solutions to their energy and environment problems. The Office helps set the energy policy direction for the Agency and responds to the short-term needs of USAID's field offices in assisted countries.

A lack of energy is seriously curtailing economic growth in developing countries and countries in transition. Expansion of energy supplies imposes a huge financial burden while increasing environmental threats in these countries. In addition, many countries lack the institutional capability and appropriate technology to operate and manage energy systems efficiently. These factors contribute to the role energy development plays as a leading contributor to global climate change and regional and local environmental problems.

To address these problems, the Office of Energy, Environment, and Technology leverages the financial resources of multilateral development banks, such as The World Bank and the InterAmerican Development Bank, the private sector, and other bilateral donors to increase energy efficiency and expand energy supplies, enhance the role of private power, and implement novel approaches through research and adaptation. These approaches include improving power sector investment planning ("integrated resources planning") and encouraging the application of cleaner technologies that use both conventional fossil fuels and renewable energy sources. The Office's promotion of greater private sector participation in the power sector and a wide-ranging training program also help to build the institutional infrastructure necessary to sustain cost-effective growth.

Further information regarding Center for Environment and Office of Energy, Environment, and Technology activities can be requested by contacting the Office of Energy, Environment, and Technology at the following address:

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Chapter 1 Introduction

1.1 Purpose

Energy efficiency financing faces a classic development problem: capital markets will not organize to finance energy efficiency unless there is a sufficient volume of projects that need financing. On the other hand, the market cannot develop a sufficient volume of projects without adequate financing. Like many other energy investments, energy efficiency is also influenced by government policies, which provide both incentives and disincentives for investment. One resolution to this dilemma is to adopt an approach that considers market conditions, financing structures, and policies at the same time. Thus, this report:

- describes the market conditions that are necessary to make energy efficiency an attractive investment
- identifies financing structures that are applicable to energy efficiency investments
- recommends strategies for all stakeholders attempting to increase energy efficiency financing.

Throughout the report two types of stakeholders are distinguished: those who view energy efficiency financing from a “macro” perspective (i.e., governments, non-governmental organizations, and bilateral donor agencies) and those who view it from a “micro” perspective (i.e., energy end-users, equipment and service providers, and financial institutions). Some stakeholders such as utilities and multilateral development banks act as both micro and macro players. Much can be gained by stakeholders understanding both perspectives.

The emphasis of this report is on developing countries and emerging market nations. Although market and financing barriers clearly exist in these countries, the potential for energy efficiency is great. Electric and thermal energy end-uses are emphasized, because this is where some of the most serious barriers to financing exist and the need for developing financing strategies in these sectors is critical.

1.2 Approach and Organization

Interviews with practitioners and policy makers, case examples of financing structures, and an extensive literature search were used in compiling this report. The diverse market and investment conditions that affect the ability to finance not just energy efficiency, but any type of investment, were also considered. In the final analysis, the strategies and recommendations presented here consider the specific problems and opportunities posed by energy efficiency; these strategies have been selected as a road map for policy-makers, business developers, and bankers who are seeking to increase the number of energy efficiency projects that receive financing.

The report contains nine chapters. Market fundamentals, the basic building blocks that need to be in place to develop sound, bankable projects, are examined in Chapter 2. This chapter also identifies the major players in the energy efficiency arena and discusses their motivations to act. Six financing strategies are discussed in Chapters 3 through 8. Each chapter outlines a type (or types) of financial structure and the major actor(s) providing financing or access to financing within that structure:

- Chapter 3: commercial sources of finance
- Chapter 4: performance contracting
- Chapter 5: vendor finance programs
- Chapter 6: utility finance programs
- Chapter 7: special-purpose funds
- Chapter 8: financing structures for the next century.

Each chapter defines the financial structure, outlines its application to energy efficiency, provides illustrative case studies, and offers recommendations.

Chapter 9 restates the overall themes and provides ten “best” strategies and recommendations for stakeholder actions.

Chapter 2 Market Fundamentals

Before capital for energy efficiency investments can be secured, markets must be developed, projects identified, partners selected, engineering and economic analyses conducted, and the decision to invest made. However, all of these actions hinge on the ability to obtain financing. Where the market fundamentals are not strong, the likelihood of obtaining financing will not be high. A strategy that never loses sight of fundamentals — favorable market conditions, motivated stakeholders, and compelling economics — is the best one for obtaining much-needed financing for energy efficiency projects. Each of these components is discussed below.

2.1 Favorable Market Conditions

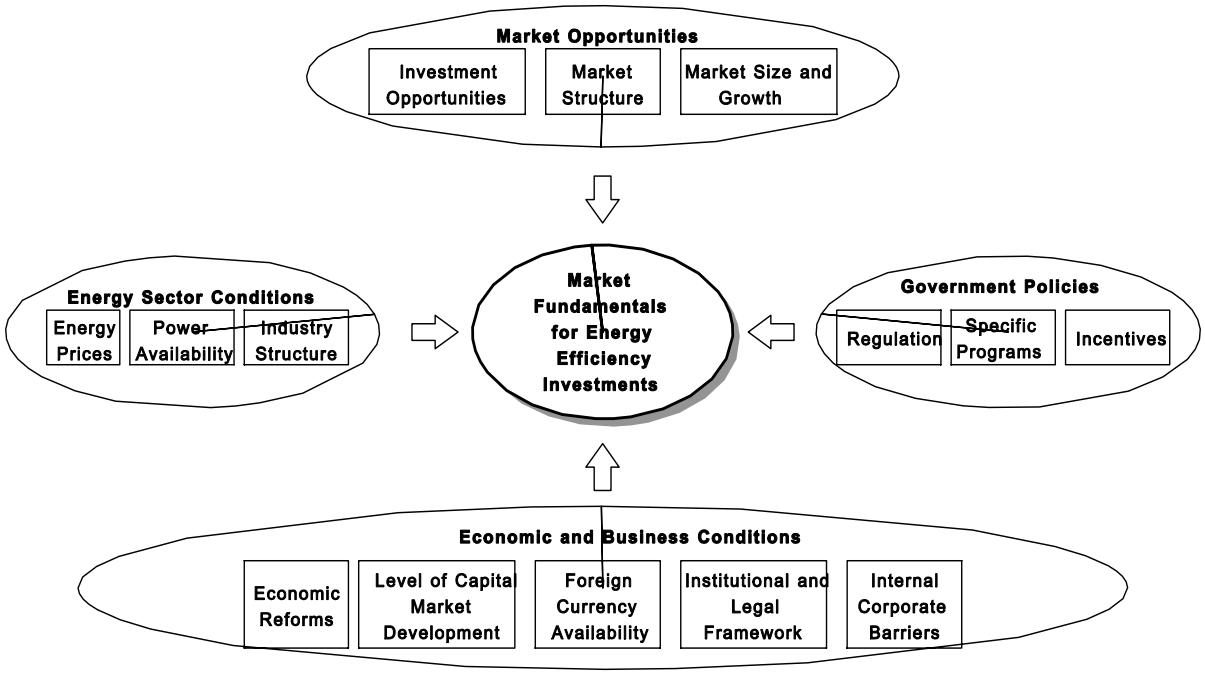
Four types of market conditions have the strongest influence on energy efficiency investments:

- the nature of the market opportunities for energy efficiency
- the conditions of a country's energy sector
- the host government's policies for energy efficiency
- the economic and business conditions within a country.

Exhibit 2-1 graphically illustrates how these market factors, taken collectively, affect the overall environment for energy efficiency investments. If all of the market factors were positive, financing for energy efficiency would be readily available.

Market Opportunities. In each country, market opportunities will differ in terms of the technologies demanded (lighting, motors, cogeneration, etc.) and the types of investments (retrofit, new construction, services). Market size, growth and structure will also vary among countries and will have different degrees of influence on investments.

Market Fundamentals Affecting Energy Efficiency Investments



***Types of Investments*.** Most investments in energy efficiency involve the installation of new systems or technologies or the retrofit of existing equipment, either through a direct investment by an end-user or through the provision of energy services by a third party. Retrofit markets for energy efficiency technologies exist in most countries. Eastern Europe and the former Soviet Union offer potentially large retrofit markets. High-growth economies are generally considered to offer more opportunities for investments in new equipment than retrofits because more new projects are undertaken. It is important to note that in some instances the energy efficiency investment may be only one component of a larger investment, e.g. the construction of a new building that will include an energy management system.

The markets for HVAC systems in two countries, the Philippines and the United States, are a good example of the difference between the markets for new investments and retrofits. In the Philippines there is a rapidly growing market for new air conditioning units. Since 1975, annual sales of residential units have increased by a factor of three and are projected to continue growing by more than 20% per year for the foreseeable future.[1] This growth is a result of the rising living standards of Filipinos. Of approximately 90,000 window-type units sold in 1994, 75% met the Philippine Government's energy efficiency standards (these units had a cooling capacity of less than 12,000 kilojoules per hour). In the United States, on the other hand, recently passed legislation required that chloroflourocarbons (CFCs), a refrigerant chemical widely used in HVAC systems, be phased out by January 1, 1996. This transition to CFC-free HVAC systems has created an opportunity for HVAC customers to simultaneously improve the efficiency of their systems through retrofit conversions of existing HVAC systems.

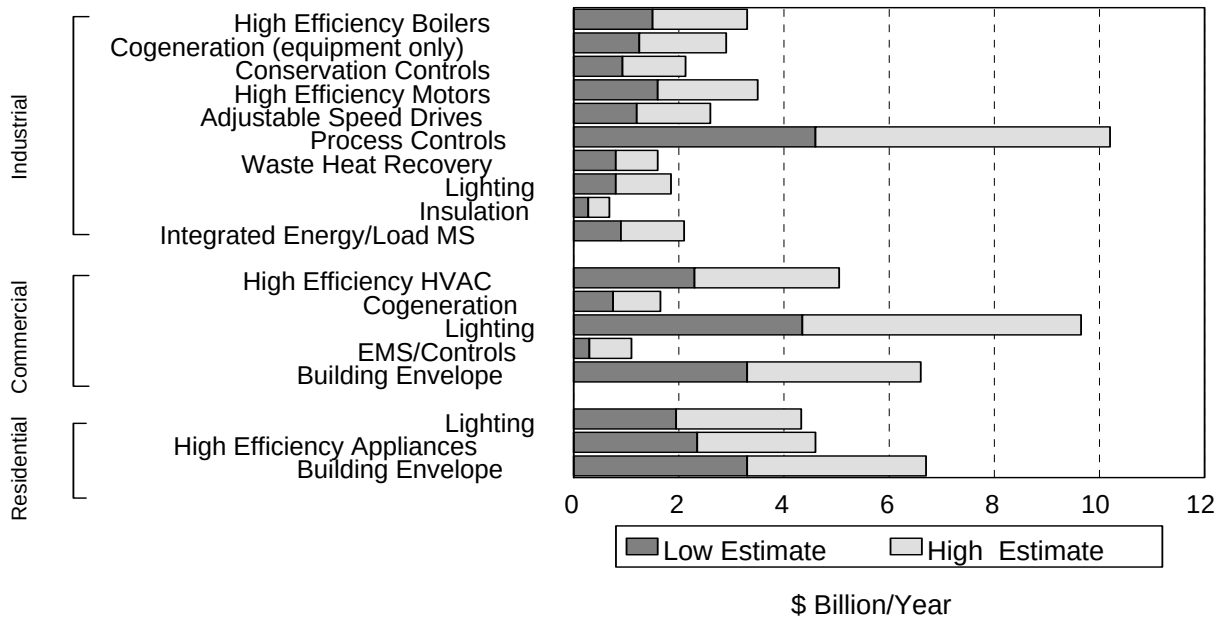
[1] Rumsey, P. and T. Flanigan. 1995. *Standards and Labeling: The Philippines Air Conditioner Program.* Washington, DC: GEEI/Publications, p. 11.

Energy efficiency investments that generally provide high savings include lighting and lamp improvements, high-efficiency heating and ventilation systems, high-efficiency appliances, and building envelope systems. Exhibit 2-2 lists of a number of technologies that are often included in energy efficiency investments.

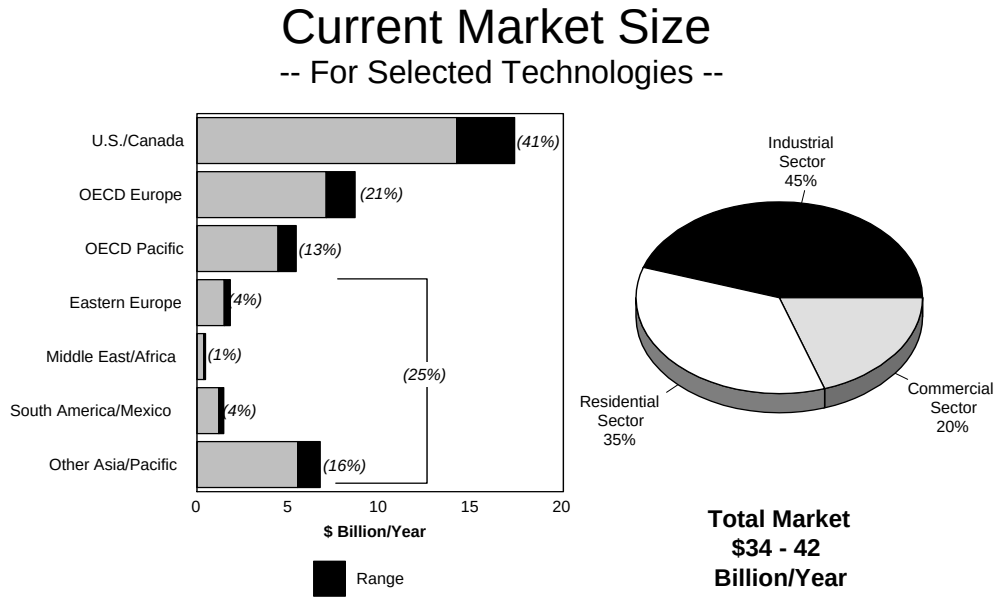
EXHIBIT 2-2
Selected End-Use Energy Efficiency Technologies

Commercial Sector	**Industrial Sector**
HVAC systems	Process controls
Heat pumps	High-efficiency boilers
Load management systems and controls	Cogeneration
Refrigeration systems/freezers	Waste heat recovery boilers
High-efficiency boilers	Insulation
Building controls	Energy/load management systems
Insulation	High-efficiency motors/adjustable
Low-emissivity windows	speed drives
Window coatings and films	High-efficiency lighting
Power factor correction systems	Instrumentation
Combined heat & power plants	Power factor correction systems
	Stream traps
Residential Sector	**Agriculture Sector**
Efficient appliances	Water pumpsets
HVAC systems	Pumping systems
Heat pumps	
High-efficiency lighting	
Insulation	

Market Size and Growth. Estimates of the current market size for energy efficiency products and services vary across sectors, technologies and countries, making it difficult to accurately value the total market. Exhibit 2-3 shows current market estimates geographically for energy efficiency products and services. One estimate places the total market size at over $80 billion, including transport and power sector technologies, plus commercial, industrial, and residential end-use products and services. The market for the latter three sectors is an estimated $34 to $42 billion per year, of which the industrial sector is the largest, accounting for 45% of this market. Some of the largest product market segments include process controls, lighting, high-efficiency HVAC, building envelope technologies, and adjustable-speed drives.



Source: Hagler Bailly, March 1995



Market size estimates by region show that the largest markets are in the United States and Canada (40%), followed by OECD Europe, Asia, Eastern Europe, South America and Mexico, and the Middle East and Africa.[2] Non-OECD markets are estimated to be 25% of the current market. Overall, market growth worldwide is expected to be a modest 6% annually through the year 2015 based on the market constraints that continue to exist. However, in developing

[2] Estimates of market size and market growth are from a Hagler Bailly Consulting, Inc. presentation on "The Global Market for Energy Efficiency" presented at the World Energy Efficiency Association Conference in Istanbul, April 1995.

countries, growth is anticipated to be more than twice as high (10% per year) than growth in industrialized countries (4% per year).

The public sector is an important element of this market in OECD countries with approximate expenditures of $2 billion per year in end-use energy efficiency. Of this, about $600 million is spent each year on government-sponsored research and development.

There is still enormous technical potential to implement energy conservation measures and to upgrade to the best available technologies for new investments. For many technologies, energy-efficient designs now represent less than 10-20% of new product sales. Many governments are thus shifting R&D expenditures to programs intended to increase market penetration and market transformation.

***Market Structure*.** Because no single market structure encompasses all energy efficiency products or services, market opportunities will vary among countries. Identifying market opportunities that lend themselves to financing is a challenge for energy efficiency because of the complex market structure and the barriers that exist. The following points highlight the complexity of the market:

- ***Diverse segments.*** The market consists of a diverse group of finished goods, components, engineered systems and energy service companies that provide engineering, project management, finance, and software development expertise to deliver savings to energy users.

- ***End-use vs. supply-side.*** The industry encompasses both end-use and supply-side applications. Project criteria and technologies differ for both.

- ***Varying distribution channels.*** Distribution channels vary widely, both by product/service and by country. Some products are available “off the shelf” (e.g., lighting). Others are sold through sales representatives who may or may not provide after-sales parts and service. The complexity of the distribution system in a given country depends in part on the size of the economy and the amount of local manufacturing and/or assembly.

- ***Range of project sizes.*** Energy efficiency projects may vary from a few hundred dollars for steam traps to thousands of dollars for motor retrofits, and to several million dollars for cogeneration systems and more extensive industrial system retrofits. This is important for two reasons: 1) a financing strategy that is applicable to a project of high value may have no application for the purchase of an inexpensive, individual technology and 2) the fixed transaction costs associated with small projects are high relative to total cost, negatively impacting a project’s economics.

Energy Sector Conditions. Energy prices, industry structure, and power availability are the three most important energy sector conditions driving energy efficiency investments.

Energy Prices. Low energy prices give rise to excessive demand for energy. By raising energy prices, the return on an energy efficiency investment rises proportionately. Energy prices that reflect the true marginal cost of supply provide the correct signals for potential investors in energy efficiency. Where energy price subsidies exist, investments in end-use efficiency are not as attractive. But such investments may still be worth undertaking for the organizations that bear the cost of the subsidy if the energy efficiency investment reduces the subsidy costs.

This is especially true where cross-subsidies exist. Cross-subsidized tariffs are common in developing countries and emerging market economies. With cross-subsidized tariffs, certain customer classes (typically residential, agricultural, or municipal customers) pay rates that are below the utility's cost of service. In many instances the "subsidy" is paid for through higher tariffs charged to other customer classes (e.g., industrial customers). In this case the utility has a financial incentive to promote and invest in end-use energy efficiency for the subsidized classes as a way to reduce losses and free up power that can be sold elsewhere, sometimes at a higher tariff, thereby increasing revenues.

Prices that reflect variable demand conditions also encourage energy efficiency investments. Time-of-day pricing more accurately captures the full value of energy by charging higher rates for peak energy consumption when less-efficient power stations are brought on line to meet higher demand.

Exhibit 2-4 illustrates how pricing of energy affects the attractiveness of an energy efficiency investment. It shows the simple payback on a residential building retrofit in Estonia for both subsidized and unsubsidized energy prices. At current subsidized energy prices, the project's payback period was estimated at seven years. Had the project sponsor faced unsubsidized energy prices, the payback would be reduced to three years. Although this project was undertaken at current prices and obtained favorable financing from NUTEK (a Swedish Government program), the higher return that would have resulted from unsubsidized energy prices would have increased the likelihood that the project would be able to obtain financing from commercial sources.

EXHIBIT 2-4
ESTONIA: ENERGY EFFICIENCY INVESTMENTS
IN RESIDENTIAL BUILDINGS

	Project with Subsidized Energy Prices	**Project with Unsubsidized Energy Prices**
Total Project Cost ($)	$90,069	$90,069
Energy Efficiency Investment ($)	$30,793	$30,793
Energy Price ($/kWh)	$0.015	$0.037*
Energy Savings (MWh/year) Range	280	280
Energy Cost Savings ($/year)	$4,311	$10,360
Simple Payback (years)		
Total Investment	20.9	8.7
Energy Efficiency Investment	7.1	3.0

*Estimate

***Industry Structure*.** Ownership, regulatory environment, and market competition are key determinants of the industry structure. The structure of the energy sector in turn plays an important role in the achievable potential for energy efficiency investments. For example, in many developing countries the power sector is characterized by vertically integrated state-owned utilities that perform commercial, regulatory and planning functions. The lack of market orientation may lead to uneconomical procurement decisions and mitigates against least-cost supply choices. Additionally, state ownership often restricts the utility's ability to raise tariffs. The impact on energy efficiency is two-fold: supply-side efficiency is affected in that the utility may have insufficient cash flow to invest in modern, efficient generation/distribution equipment; and end-use efficiency suffers if tariffs are artificially low, sending incorrect pricing signals to energy consumers.

Many countries are restructuring their power sectors as a means of introducing competition into the sector, for example, by unbundling generation, transmission and distribution functions, and allowing open retail access. The restructuring ultimately may lead to better pricing signals for consumers regarding the value of saving energy. Introducing competition into the energy sector may also induce utilities to invest in energy efficiency, either as a cost-cutting measure or to retain customers by providing value-added services (Chapter 6 provides a more detailed discussion of the potential for utilities to offer such services).

Power Availability. In countries with power shortages, energy efficiency may provide additional financial and economic benefits. (Exhibit 6-2 contains a list of selected power-short countries.) For example, in the residential and commercial areas of Sao Paulo, Brazil there are often unplanned power outages. The utilities are now turning to energy efficiency to address this problem and to avoid new investments in transmission and distribution. In South Africa, where nationwide electrification has become a political imperative, the national utility is unlikely to be able to build transmission and distribution capacity fast enough. Improved energy efficiency is a key to stretching current generating capacity toward meeting that goal.

In an energy shortage situation, many customers may be willing to pay more for electricity to operate their industrial enterprises, but more electricity is not available from the grid at any price. These users may then invest in their own generators, which are more costly than electricity from the grid on a per kWh basis. Thus, saved electricity that is delivered to industrial end-users through energy efficiency measures is valued at the forgone cost of generating their own electricity. These end-users are thus motivated to implement energy efficiency measures that reduce their energy requirements at or below this price.

Host Government Policies. Government policies that support investment in energy efficiency can make an important difference in the level of these investments. Governments stimulate energy conservation through regulation, incentive structures, and specific programs. Such policies are pursued for the societal benefits that improved energy efficiency can bring: minimization of power shortages, decreased environmental degradation and overall economic efficiency.

Government programs that set standards for building codes, appliances and other technologies are one way to encourage energy efficiency investments. In Thailand, voluntary building codes under the Energy Conservation Act are expected to push the market for energy efficiency measures in commercial buildings. The Government of India has supported energy efficiency initiatives for many years. In 1990 it launched a new program to improve industrial energy efficiency by deregulating the domestic economy to spur competition, reducing import tariffs on energy-saving technologies, and adopting fiscal incentives such as a 100% depreciation allowance on energy efficiency equipment.[3] In Brazil, the government has established an energy conservation agency, PROCEL, which is a part of the state-owned electric utility, ELETROBRAS. PROCEL is dedicated solely to the promotion of energy efficiency. The energy efficiency programs initiated to date by Brazil have offset over $400 million in generation investments.[4]

The justification for government intervention is to address specific market failures that limit the achievement of the technical potential for energy savings. These market failures include:

- lack of information and high transaction costs
- split incentives (disconnected decision makers)
- externalities
- differences in product attributes.

A restructured energy sector with competitive, fully-functioning markets will not necessarily eliminate all market failures. Thus, there is still likely to be a role for government policies that promote energy efficiency.

Economic and Business Conditions. The most important economic and business conditions affecting the attractiveness of energy efficiency investments are economic reforms, the level of capital market development, availability and rates for conversion of local currency into foreign exchange, the institutional and legal framework for investments, and internal corporate barriers.

Economic Reforms. As trade barriers are removed, the volume and flow of trade increase. Often, energy efficiency products are not produced locally and carry high import tariffs. Reductions in tariffs can have a favorable effect on energy efficiency product sales. In Pakistan, for example, the import duty on compact fluorescent lamps (CFLs) was reduced in 1990 from 125% to 25%. As a result, the price of a single CFL dropped by almost half, and sales started to rise.

Increased international competition puts greater pressure on companies to be cost-competitive. Traditionally, as low-cost producers, developing country firms increased production as the primary means of increasing market share; now they must also look at reducing costs. The

[3] The World Bank. 1993. *Energy Efficiency and Conservation in the Developing World: The World Bank's Role.* Washington, DC, p. 42.

[4] ELETROBRAS. "PROCEL: The National Program for Conservation of Electricity," brochure.

privatization of government-owned industries is one example of how increased competitive pressures will force firms to be more efficient and cost-conscious.

***Level of Capital Market Development*.** Capital flows to developing economies have increased dramatically over the past decade. Most notable is the significant increase in private capital flows. In 1994 the net flow of private loans to developing economies surpassed the net flow of official development finance. Although it is difficult to measure the impact of increased capital flows, these trends bode well for investment in energy efficiency as domestic credit markets should begin to offer financing more in line with the terms and conditions prevailing in global capital markets.

However, it may not be possible for countries with less developed capital markets to use some of the financial structures employed in countries with highly developed capital markets. Some of the energy efficiency financing structures in the U.S. market take advantage of the high level of capital market development. For example, energy efficiency mortgages for residential energy end-users have been developed in the United States. These programs rely upon a well-established residential mortgage market and consumers' easy access to credit. Financing energy efficiency through residential mortgages is feasible because the mortgage market is structured specifically to serve small individual borrowers, partly as a result of the tax advantages associated with interest rate deductions on mortgage borrowing. Many countries simply have no home mortgage market and will not be able to replicate this structure. In these situations, other financing mechanisms need to be pursued, such as the local utility providing credits for residential end-users or utilizing other types of housing finance.

Many developing and transitioning economies face a shortage of domestic capital for investments of any type. Under conditions of capital rationing, high interest rates dictate that only those projects with the quickest payback and greatest return for a limited amount of risk receive financing. The lack of domestic sources of financing requires project sponsors to abandon potentially profitable projects or look to international markets and foreign lenders for financing.

In the same vein, residential, agricultural, and industrial end-users in developing and transitioning economies may lack internal sources of capital. Developing countries, by definition, have low per capita income. Because many of them may also have a greatly unequal income distribution, few individuals in the country may have the personal wealth available to invest in residential energy efficiency. Many private and state-owned firms in developing and transitioning economies are in poor financial condition, with uncollectible accounts receivable and lack of cash flow to invest in energy efficiency. In Russia and Ukraine, for example, the non-payment of suppliers has become a major problem. With industries or individual end-users facing such capital constraints, investments of any type will likely be minimal.

***Foreign Currency Availability*.** Many countries have limited medium- and long-term debt available, and require foreign capital for investments that provide returns in local currency. This causes currency risk (availability and rate of foreign exchange) that narrows the range of market opportunities or limits the group of investors to those who are willing to assume currency risks. In the wake of a devaluation of the domestic currency, the project sponsor would bear a much

greater effective interest rate because more units of domestic currency are required to repay the fixed foreign currency repayment obligations, thus negatively affecting project economics. The substantial (56%) devaluation of the Hungarian Forint was a major factor in the default of a municipality that financed efficiency investments for its district heat system by borrowing on a World Bank line of credit administered by Credit Anstallt and guaranteed by the Hungarian state bank.

Where currency is not freely convertible and there is limited access to foreign currency to pay for imports, project participants may resort to barter and counter-trade arrangements to circumvent currency restrictions. However, currency inconvertibility, barter, and counter-trade bring additional complications and increase the level of risk in the transactions necessary to implement the project.

***Institutional and Legal Framework*.** Successful energy efficiency investments require an institutional and legal framework that can accommodate them. Countries with overall favorable investment climates in general will be favorable for energy efficiency. However, there are some types of contract structures specific to energy efficiency investments that may or may not fit with a country's institutional and legal framework. For example, in the United States and Europe, performance contracting is widely used for energy efficiency. In this finance structure, investments are repaid based upon the performance of the installed efficiency equipment which is usually measured by the level of energy savings realized (Chapter 4 provides a full discussion of performance contracting). Although the concept of performance contracting is sound, its success relies upon a set of sophisticated contractual agreements and the presence of an entity that measures and verifies the savings.

Under performance contracting, legal and contractual issues (including the risks inherent in litigation) become more important because this structure rests on an extensive network of contracts detailing the relationships of the parties. End-users may not possess the mechanisms to measure their energy usage and subsequent savings. Metering only at the facility gate provides no information about specific processes. Energy bills based on out-dated energy usage information — as may be the case in certain developing and transitioning economies — also provide little guidance in decision-making. The lack of precise information on energy usage makes it difficult for end-users to evaluate prospective energy efficiency projects and monitor their performance after implementation.

Internal Corporate Barriers. For most businesses, energy efficiency investments must compete directly with investments to maintain or expand market share and production capacity. The priority of other investment opportunities may cause the firm to reject cost-effective energy efficiency investment opportunities. Energy may not always be a critical issue or energy costs may be a small component of total production costs. Accordingly, management will not provide sufficient support for energy efficiency investments when there are larger line items that must be managed. In addition, within a business enterprise, no single party or department may have clear and explicit responsibility for energy costs. Within the operations department, for example, the maintenance group may be charged with managing certain cost items such as energy, but may lack the mandate to re-engineer the production process to realize energy savings. Thus, energy efficiency improvements often are not pursued.

2.2 Motivated Stakeholders

For any energy efficiency investment there must be a motivated stakeholder to drive the project's implementation. Quite obviously, the parties who benefit from energy efficiency are the ones most likely to play this role. Which stakeholder steps forward as the "motivated" one, however, depends upon market conditions and project economics. The challenge is to identify motivated players.

The nature and characteristics of energy efficiency investments suggest there will be multiple stakeholders with diverse motivations. For example, where financial institutions and energy end-users may be most concerned with tangible cost savings and attractive returns, a government agency may give equal weight to the potential societal benefits of an energy efficiency project and the costs and benefits of implementing it. While recognizing the diversity of motivating factors among various stakeholders, these motivations (and hence, the stakeholders) can be simply divided by the concepts of "micro" and "macro." Macro-level stakeholders are generally concerned with the overall policy implication environment for energy efficiency. Micro-level stakeholders are generally motivated by the potential to maximize profits or value.

Exhibit 2-5 shows a model of key stakeholders and their different motivations. The key entities at the micro level include energy end-users, energy suppliers (utilities), financial institutions, banks, and energy-related services or equipment providers. Macro-level stakeholders include host government entities (e.g., national energy agencies, regulatory commissions, energy conservation centers), multilateral development banks or other donor/bilateral aid agencies, and non-governmental organizations and associations. In some instances macro-level entities are parties to energy efficiency projects, thus acting at the micro level. Likewise, energy suppliers, utilities and multilateral development banks are sometimes macro players.

One challenge is to coordinate, and in some instances, merge the diverse motivations of stakeholders. This is especially true in the case of energy efficiency projects where the economic incentives are insufficient to induce the private sector to act. In the many cases presented throughout this report, public sector entities played a critical role in either developing the project or providing financial support; most of the programs have received some type of financial support from a macro player.

Energy End-Users. The most obvious motivation for an end-user to invest in energy-efficiency is to reduce spending on fuel or energy. The purchase of new equipment or the retrofit of existing equipment as part of an energy efficiency investment may also be critical to modernizing an end-user's facility. If an energy efficiency project is properly financed, it can typically generate immediate positive cashflow for the end-user. The new cashflow can improve the end-user's profitability or be used to finance the replacement of old equipment or other capital improvements that in turn result in improved productivity.

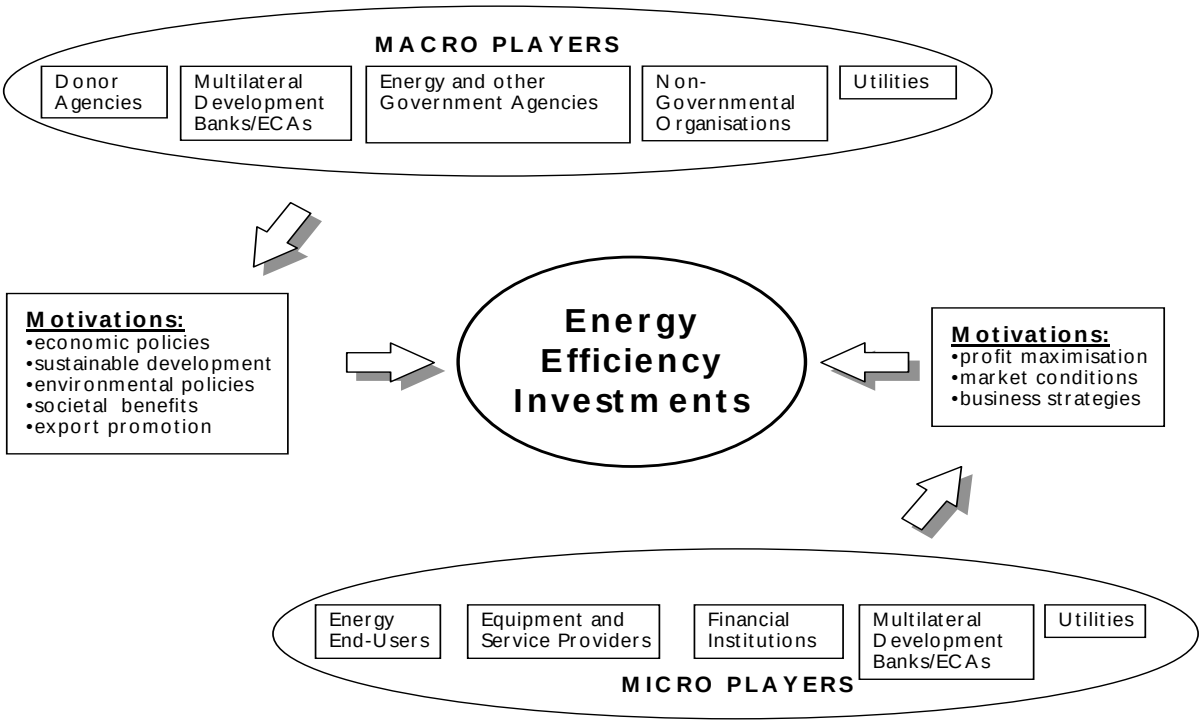
Theoretically, if the economic rate of return on an investment is greater than the cost of capital, the investment should be undertaken. But end-users do no always act on this logic. For example, there may be low awareness of energy efficiency options, limited access to energy

efficiency products and services, or important information on them, or a lack of understanding of who will benefit (the end-user or split with a third party). Additionally, end-users do not always possess the financial skills and knowledge to properly evaluate the higher capital costs of most energy efficiency projects against the operating benefits.

Energy-Related Equipment and Service Providers. These stakeholders are motivated by the potential to gain from market entry or market penetration. By seeking out the fastest growing markets, a vendor's customer base can be substantially widened and market share increased. In developing countries, where there are few established markets for energy efficiency goods, such motivations may be minimal or non-existent. This presents an opportunity for stakeholders to intervene to organize the market.

Energy Suppliers (Utility Companies). Although end-use efficiency investments may not at first glance seem to benefit a utility that derives revenue from the sale of power, such investments can be valuable. Under certain circumstances, such as increased competition in the power sector, end-use energy efficiency services and financing on the part of the utility may be a service that helps retain customers. For example, by sponsoring an energy efficiency project that requires a fixed-length contract over which the energy savings will be realized, the power distribution company is able to capture or lock-in the customer for the life of the contract. Alternatively, utilities may need to consider supply-side efficiency investments. As utilities are placed in more competitive markets, they will be forced to consider the full costs of their operations. In such an atmosphere, cost-effective energy efficiency investments may appear more attractive than the additional cost of new generating capacity. Additional discussion of utility motivations is found in Chapter 6.

Micro and Macro Players Have Different Motivations



Financial Institutions. Banks and other financial institutions are usually motivated by profit and market share. They will be interested in energy efficiency if it is demonstrated to have acceptable risks and returns, and manageable transactions costs. The key to motivating bankers is to present them with a creditworthy borrower seeking capital that meets the bankers' minimum size requirements. If banks are convinced that a market exists, they may be willing to devote staff resources to understanding the market and to crafting specific financial structures to accommodate the market. Government-supported financial institutions such as multilateral development banks and export credit agencies have policy objectives to meet in addition to the requirement to be self-sustaining.

***Macro-Level Stakeholders*.** There are economic and environmental benefits to be gained from energy efficiency investments, providing the rationale for macro-level stakeholders to be the "motivated" stakeholder. While each of these stakeholders takes different actions to reach its objectives, they tend to be motivated by the same three reasons related to the benefits of energy efficiency. These are:

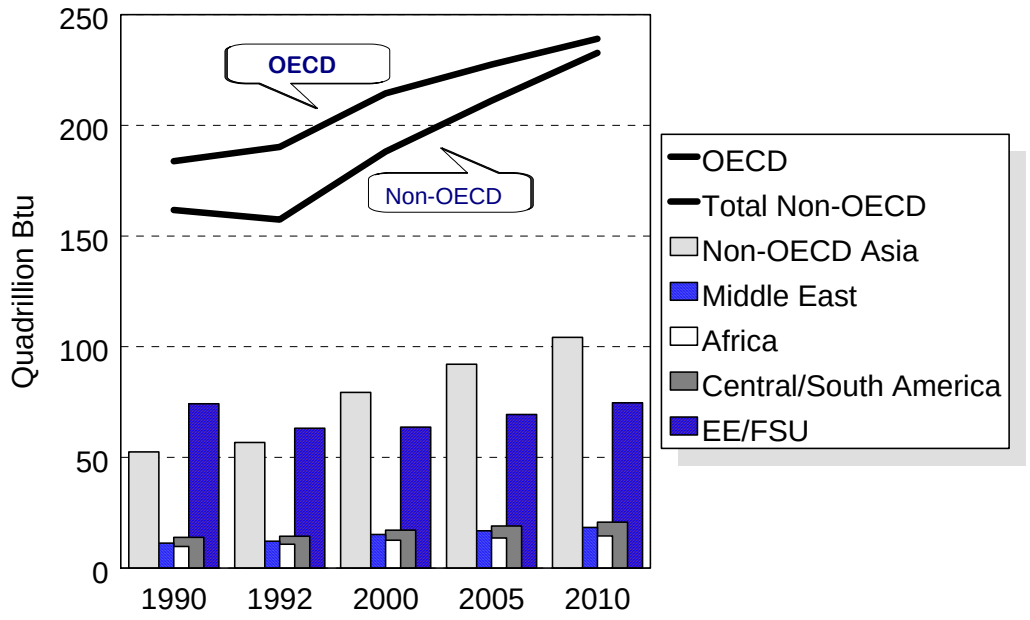
- ***Energy and Economic Development***. One role of energy efficiency is to provide the means to reduce energy costs and consumption, thereby promoting economic growth and improving productivity and industrial competitiveness. Traditionally, countries have increased their energy capacity/supply in response to economic growth. But populations in some countries are growing rapidly. Ensuring ever higher living standards for this increasing population will require rapid economic growth in the developing world. This growth will be fueled by ever-increasing demands for energy services. As Exhibit 2-6

illustrates, commercial energy consumption in non-OECD countries is projected to rise dramatically, nearly equaling that of OECD countries by 2010.

- ***Easing Constraints on Scarce Resources***. Expanding power generation capacity may not be a viable option for developing countries that are trying to meet all of the expected increase in energy demand. The estimated levels of capital investment could lead to the crowding out of essential investment in other socially and economically important activities. The World Bank estimates that $100 billion will be needed each year over the next decade for electric power supply investments in developing countries.[5] Energy efficiency measures can, on the other hand, reduce the need for capital investment in new generation capacity.

- Environmental Concerns. The forecasted exponential growth in energy consumption has disturbing implications for the environment. Because the fossil fuels that fire many generation plants are a primary source of greenhouse gases, there is an important role for energy efficiency to play in reducing greenhouse gas emissions.

Energy Consumption by Regions: 1990 - 2010



Source: EIA, International Energy Outlook 1995

A good example of a country adopting a macro approach to energy efficiency is Thailand. The Thai Government, recognizing the potential negative impact of unchecked growth in power

[5] World Bank, op cit., p. 26.

demand, has set a course for energy conservation. Thailand has taken some aggressive steps to promote energy efficiency and has involved several macro players. The government has passed legislation requiring specific levels of energy efficiency in large buildings and industrial facilities, and has also established several creative financing mechanisms. Exhibit 2-7 highlights the impetus for Thailand's program and the measures the government has taken to improve the environment for energy efficiency investments.

Example of a Motivated Macro Player: Thailand

Current situation: Demand for electricity in Thailand has grown an average of 12% per year for the last five years. The Electricity Generating Authority of Thailand (EGAT) forecasts the need for an additional 12,000 megawatts of generating capacity over the next decade. The capital cost to meet this demand is projected at roughly $35 billion. The long-run marginal cost of energy from new generating plants is estimated at $0.043/kWh; the cost of new capacity is estimated to be $1,482/kW. The estimates for new capacity are based on a lignite-fired unit without flue gas desulfurization pollution controls. EGAT believes such technology would add 25 to 30% to the capital cost of such a plant.

Measures taken: Recognizing the severe impact of rapid growth in electricity demand, the Thai Government in late 1991 became the first Asian country to adopt a comprehensive demand-side management plan for the power sector. The five-year plan (1993-1998) calls for EGAT to invest $189 million to save an estimated 311 peak megawatts. The measures taken by the Thai Government include:

Energy Conservation Promotion Act*:* This Act established one of the largest government funds to provide grants and low-interest loans for investment in energy efficiency and renewable energy projects. The Act targets energy conservation in large buildings and factories, and establishes efficiency standards. A category of "controlled factories and buildings" was identified; these facilities must appoint an energy manager certified by the government. Additionally, these facilities are required to conduct energy audits, collect data on energy consumption, and prepare a conservation plan. A model energy code was prepared for new commercial and institutional buildings; compliance with the code is currently voluntarily, pending further development of municipal building code inspection agencies.

Demand-Side Management Plan*:* EGAT established a DSM office in 1993. The DSM programs provides financial incentives to encourage customers to purchase energy-efficient equipment. The five areas outlined in the table below are key targets for investments. EGAT compares the cost of purchasing electricity savings to the cost of building new power plants. Only those measures that cost less than the cost of building new generation capacity are included in the DSM program.

Energy Conservation Promotion Fund*:* The Fund, currently in the developmental phase, will promote efficient use of all fuels and renewable energy. It will be set up with money transferred from three sources, including a revitalization of the Petroleum Price Stabilization Fund, an annual levy on petroleum and natural gas refinery products, and funds from foreign governments or international organizations, including the World Bank and the Asian Development Bank. Low-interest loans will be provided for a range of energy efficiency and renewable energy projects and related environmental activities.

A Summary of Thai DSM Programs

Program	Peak Savings Five-Year Target	Energy Saved Five-Year Target	Capital Cost (US$ Millions)
Lighting	151 MW	830 Gwh/yr	1,010.0
Refrigerators	27 MW	186 Gwh/yr	60.0
Air Conditioners	22 MW	117 Gwh/yr	30.0
Commercial Buildings	81 MW	468 Gwh/yr	120.0
Industrial Motors	30 MW	225 Gwh/yr	190.0

In addition, funds are to be used for education, promotion, demonstration, monitoring, research and development, technology transfer, policy and planning, and for the administration of the Fund. Financial assistance may be granted to individuals, businesses, non-governmental organizations, government agencies or state enterprises. The initial allocation to the Fund was $80 million. The government has levied a tax of 0.10 baht/liter ($0.011/gallon) on refinery products. Of this amount, 0.07 baht/liter goes to the Energy Conservation Promotion Fund and 0.03 baht/liter goes to an environmental fund, called the Environmental Quality Fund. This levy will result in an annual inflow of capital to the Energy Conservation Promotion Fund of approximately $60-80 million.

Related government efforts: In addition to the measures outlined above, the Thai Government has enacted an import tax reduction of 50% for any energy efficient equipment that uses substitute fuels and for raw materials used to make energy efficient products. The duty reduction can also be applied to materials with a value greater than $15,000 to be used in commercial building projects. In one recent case, a Thai trading firm was granted a duty reduction for 2,600 compact fluorescent lamps that it imported from Germany and installed in a five-star Bangkok hotel. The normal duty of 30% was reduced to just 5% for this project. Nonetheless, import duties on major energy-using products are still prohibitively high and need to be reduced. For example, the import duty on lamps and ballasts ranges from 30 to 50% and is inhibiting the import of efficient lighting and equipment into the Thai market. The Board of Investment (BOI), a government agency, also promotes various types of investments, including the domestic manufacture of efficient appliances and electrical equipment. Through the end of 1991, BOI had granted promotional privileges to 88 firms that manufacture energy-using equipment and related materials. As a result, these firms made initial investments of more than $800 million.

Source: Royal Thai Government, Thailand's Energy Efficiency Industry: Potential for Investment, September 1993. Personal communication, Flynn Bucy, 1995.

2.3 Compelling Economics

Energy efficiency investments must provide acceptable returns for those who are making the investment. Risk and return in the context of energy efficiency are discussed in this section. Strategies for structuring financing, which include risk allocation and management, are contained in subsequent chapters.

***Return*.** The payback period is the measure most often used when evaluating the returns on energy efficiency projects. The payback period is simply a measure of the time it takes to recover the initial capital outlay for a project through net savings. (The payback on a $1.00

investment is 3 years if the annual savings are $0.33 per year.) Payback periods on energy efficiency investments vary from as little as a month to several years. Most individual measures with paybacks of two years or less are considered worth implementing by the private sector. However, in many emerging market countries, where interest rates and inflation remain high, only projects with a payback of one year may be considered attractive by the market until inflation and interest rates are reduced.

Using payback as a measure of the return on an investment is limiting, however, and may be discouraging investment in energy efficiency because the decision maker may not be considering the project's full benefits. Comparing projects on the basis of each project's payback period does not always result in the best project being chosen, nor does it provide an indication of the total return from an investment based upon the total life of the installed measures. The payback period does not take into account the net profits or net savings achieved after the initial capital investment is recouped.

Net present value (NPV) calculations, on the other hand, allow projects with different durations to be compared in terms of their discounted cash flow. In addition, NPV calculations can be structured to incorporate depreciation, tax implications, variable cash flows, and the time value of money. These issues, not usually incorporated into a payback period calculation, are important elements in evaluating of a potential financing structure.

There are two other useful methods for evaluating returns: internal rate of return (IRR) and annualized life cycle costs. The IRR for an investment is defined as the rate of discount at which a project would have a zero NPV. In other words, the cumulative net present value of all project costs would exactly equal the cumulative NPV of all project benefits, if both are discounted at the IRR. One significant pitfall to using IRR, however, is that it may provide the wrong ranking of mutually exclusive projects that differ in economic life or in scale of required investment.

The life cycle cost approach allows a comparison of the financial attractiveness of investment opportunities that vary in terms of economic lives and the cash flows over those lives. In this approach, the varied cash flows of the investments are converted into a uniform stream of annual cash flows by finding the present value of each annual cash flow and then determining the value of a uniform series of cash flows that is equivalent to that present value. While this type of analysis yields a measure of the levelized annual cash flows accruing to an investment opportunity, the magnitude of the initial investment and the number of years that the cash flows will be maintained are hidden in the analysis. This analysis is most useful when comparing alternative investments that have different useful lives. Life cycle analysis is useful for investors, such as electric utilities, that are making comparisons between electricity supply and energy efficiency options.

Determining returns is a straightforward exercise, assuming that the necessary input data are available. In the case of calculating simple payback, only the initial cost of the investment, the energy savings and the financing terms, if any, are necessary. The limited amount of data required is probably the reason why payback measures are so widely used in discussions of energy efficiency.

Exhibit 2-8 provides an illustration of each of the above measurements for a waste heat recovery example.[6] The initial costs of the project are estimated at $45,000. The service life of the project is 10 years, producing annual savings to the end-user of approximately $14,800. The end-user's cost of capital is 12%.

EXHIBIT 2-8
Financial Analysis of a Waste Heat Recovery Project

Initial Cost	$45,000
Service Life	10 years
Cost of Capital	12%
Annual Savings from Project	$14,800
Simple Payback (years)	3.05
Net Present Value	$62,143
Internal Rate of Return (%)	35.21

In addition, the selection of discount rates has a significant impact on the calculation of returns. Where discount rates are extremely high, the returns on efficiency investments will obviously be much lower. An efficiency investment with a four-year payback may have a positive net present value with a 15% discount rate and a negative net present value at a 30% discount rate. Large and established companies in developed countries with access to multiple sources of capital may operate with low discount rates, for example, 12%. However, in the case of individual consumers income level affects the discount rate that is used to evaluate investment decisions.

Similarly, enterprises in countries with a serious lack of capital may also have very high discount rates. In developing countries where individual and small business incomes may be low, the cost of capital may be very high, in excess of 30% and as high as 60%. The impact of this on energy efficiency investments is that only those efficiency measures with the highest returns are likely to be undertaken. Where the discount rate is very high, it may be difficult to encourage the consumer or the company to undertake the investment. In this situation, other investors, such as utilities or governments, may be more willing to pay for the energy efficiency measures.

***Risks*.** The allocation of risks among the parties is central to the decision to invest and the available financing options. The amount and nature of risks that a party is asked to bear determines the party's required return. The greater the risk, the greater must be the expected or required return, *ceteris paribus.* Otherwise, the party would seek opportunities with a more

[6] USAID Energy Conservation and Efficiency Program (ECEP). 1991. *Energy Management for Companies*. p.9-21. ECEP was a program funded by USAID/Egypt. The project seeks to promote and accelerate the transfer and adoption of energy-efficient technologies, processes and practices to Egypt, and to improve Egyptian institutional capabilities to promote and implement energy-saving and productivity-enhancing investments.

favorable risk/return ratio. Risk allocation in the context of the energy efficiency investor is discussed below.

The level of risk associated with energy efficiency investments is different from other types of investments, primarily because energy efficiency investments provide incremental cash flow, not by adding a new source of revenues, but by reducing costs. In evaluating an energy efficiency investment, it is important to clearly identify the basis for the incremental cash flows that create the positive return and provide for debt repayment. Sources of risk in energy efficiency investments include:

- technical performance of the efficiency measures
- patterns of energy usage on the part of the end-user
- requirement for ongoing maintenance
- fluctuations in energy prices
- foreign exchange fluctuations
- construction/installation risks
- warranty risks.

Technical Performance. Estimations of returns on energy efficiency investments rely upon technical estimates of the energy savings expected to result. Where the end-user purchases energy-efficient equipment and is responsible for its operation, the end-user bears the risk of making inaccurate technical energy savings estimates before the project begins operation. Alternatively, technical risk can be shifted to an intermediary (e.g., an ESCO) through a performance contract.

Whether the technical energy saving potential of an investment will be realized depends on the performance of the equipment under operating conditions. The end-user bears the risk of the equipment not performing at estimated levels or not realizing its potential due to adverse operating conditions. The best way to minimize this risk is to acquire only proven technologies with tested applications; many energy efficiency technologies are considered to be proven.

***Fluctuating Usage*.** The energy efficiency investor bears the risk that changes in its operations may change the expected return. Altering the manner in which equipment is used to meet certain business objectives can result in suboptimal energy usage patterns. In addition, reducing equipment use decreases the energy savings return from the investment.

***Maintenance*.** In order for energy-efficiency equipment to generate its technical energy savings potential, it must run at or near its optimal level of output. Reduced potential will be realized as the equipment deteriorates over its service life (the rate of deterioration will depend on the quality of maintenance). The end-user who purchases energy efficiency equipment bears risks related to its maintenance. Of course, the end-user can reduce its risk (but not necessarily the risk of the investment) by contracting with a third-party to provide maintenance services for a fee. The fee is the price for *shifting* some of the risk from the end-user to the maintenance company.

Fluctuating Energy Prices. The financial savings from an investment also depend on the value of the energy saved. Fluctuating energy prices introduce additional risk for the end-user. Higher energy prices make an investment in energy efficiency more attractive since the value of energy saved will also be higher. Conversely, a fall in the price of energy will reduce the value of energy savings resulting from an investment.

***Foreign Exchange Risk*.** If an energy end-user in a developing or transitioning economy goes to international credit markets or international financial institutions to finance its energy efficiency investments, it may incur additional foreign exchange risks. To the extent that the end-user borrows and has its repayment obligation denominated in a foreign currency, but pays its energy bills (and thus has its energy savings denominated in) a local currency, the end-user bears foreign exchange risk. Local currency devaluation requires more units of the local currency to meet fixed foreign currency payments of interest and principal. Adverse changes in foreign exchange rates may cause an end-user to be unable to service its debt. The effective borrowing cost in local currency may become prohibitively large, even though the foreign currency equivalent remains unchanged.

The equipment or service provider bears foreign exchange risk related to its sales of equipment or services to the extent that its revenue is denominated in a different currency than its materials or labor costs. Adverse foreign exchange adjustments may erode the profit margin of the contractor or vendor.

Construction/Installation Risk. Many contingencies may arise during the construction and installation phase of an energy efficiency project. These may result in materials and labor cost overruns. If the installation and construction service provider is paid on a fixed-fee basis, the contractor bears the risk of these cost overruns eroding its profit. Of course, contracts may be crafted that provide the contractor with some recourse to the customer in the event of certain types of unforeseen circumstances.

Warranty Risk. During some stipulated period after the energy efficiency equipment is installed, the manufacturer or vendor may be liable for the replacement of any malfunctioning equipment at no or reduced cost to the customer. During this period, the vendor bears the risk that it will incur additional costs to rectify faulty equipment. However, the vendor may choose to sell extended warranty contracts. Here, the vendor is willing to bear the additional risk if adequately compensated. The end-user may be willing to pay the additional fee to reduce its own risk.

2.4 Strategies to Improve Market Fundamentals

The likelihood of obtaining financing for an energy efficiency investment improves where market fundamentals are good. As was illustrated previously in this chapter, an energy efficiency investment is set in the overall framework of market fundamentals. Certain conditions and key players must exist for projects to move forward to the financing stage. There are a number of recommended actions that can be taken to improve market fundamentals:

- foster a market-oriented energy sector
- implement policies that address known market failures or that support energy efficiency

- facilitate market transformation for energy efficiency technologies and services.

Foster a market-oriented energy sector. The first important step in fostering a market-oriented energy sector is to set energy prices that reflect the true cost of supply. Energy prices are critical inputs in the economic analysis of an energy efficiency investment. Incorrect price signals — as a result of government intervention or subsidies — ensure that the financial analysis of an investment will be skewed in some manner. The removal of subsidies and elimination of the practice of cross-subsidies will go a long way toward developing a pricing system based on true costs. Prices that do not reflect actual costs are also detrimental to utility planning and management, hindering the mobilization of resources for new investments. Finally, utilities also need to consider peak pricing schemes such as time-of-use rates. Peak loads can be changed through pricing that discourages energy consumption during peak hours.

Implement policies that address known market failures or that support energy efficiency. Policy initiatives can play an important role in correcting market failures that prevent investment in energy efficiency. The lack of information about the availability and reliability of technologies and services can be addressed through the strengthening of local or national resource centers, information dissemination campaigns or other forms of intermediation. Alternatively, policy initiatives can be used to support energy efficiency. Efficiency standards and codes are one such example. Another example is tax incentives. In either case, the objective of policy initiatives should be to minimize the transaction costs and risks (perceived or real) associated with investing in energy efficiency.

Facilitate market transformation for energy efficiency technologies and services. This is really a two-fold process that entails creating an institutional and legal structure that favors commercially-oriented entities, and taking steps to increase the market acceptance and penetration of energy efficiency technologies and services. General business and economic conditions, if they include such things as developed (or developing) capital markets and liberal trade policies, provide an environment conducive to energy efficiency investments. For example, when both standard and high-efficiency equipment are imported, import duties raise the price differential between the two since high-efficiency equipment is generally more expensive. Reduction of import duties and other non-tariff barriers should stimulate greater market penetration of efficiency technologies. Market penetration of new, more efficient technologies is also spurred by minimum performance specifications or competitive procurement initiatives.

Chapter 3 Commercial Sources of Finance

Commercial financial institutions represent an important source of untapped funds for energy efficiency projects; nearly half of all capital market activity worldwide in all sectors involves commercial loans and leasing. Commercial sources of financing may be obtained for new investments as well as energy efficiency retrofits.

Commercial financing sources include loans and lines of credit, leasing, trade finance, consumer credit, vendor finance, mortgage finance, and project finance. This chapter includes a discussion on the important role of local financial institutions in energy efficiency financing and an in-depth discussion on the potential for leasing, which has proven to be particularly adaptable to energy efficiency projects. The chapter does not provide an equal discussion on the applications of traditional term bank loans since the credit evaluation process for commercial loans is very similar to that of leasing. It should be recognized, however, that commercial loans are a potentially viable option for energy efficiency financing. While the discussion does not emphasize commercial bank loans, many of the examples provided here involve commercial credits. Vendor financing is discussed in Chapter 5 and project financing for energy efficiency is discussed in Chapter 4 on Performance Contracting.

3.1 The Role of Local Financial Institutions

The most important sources of commercial financing for energy efficiency investments are local financial institutions: commercial banks, non-bank financial institutions such as leasing companies, and government- and privately-owned development banks that lend to commercial enterprises. Since many energy efficiency investments are small (under $1 million), local financial institutions play a very important role as retail distribution agents. But they are not restricted to this role; local financial institutions can also assume a wide variety of other important roles, including:

- financial intermediaries with international institutions
- facilitators and financiers for trade transactions
- direct lenders and guarantors
- lessors
- mortgage and construction lenders
- fund administrators and agents
- experts in local business conditions and customer credit.

The ability of local financial institutions to assume any of these roles will depend upon the nature of the proposed energy efficiency project, the level of market demand for energy efficiency financing, and the resources of the local capital markets in each country.

It is Generally Easier to Obtain Commercial Sources of Financing for an Energy Efficiency Investment when it is Part of a New Investment and not a Retrofit. Many energy efficiency investments are imbedded in the goods and services that constitute investments in new plant

and equipment. In these instances, the energy efficiency component can account for a relatively small portion of the total investment. This occurs in new commercial and residential building construction, where the latest energy management systems and building controls are installed, and where efficient windows, lighting and HVAC systems are incorporated into the building design; in newly constructed industrial facilities that procure energy-efficient process controls; or the simple consumer purchase of a new, more efficient, electrical appliance.

For New Investments, the Costs of Energy Efficiency are Included in Financing Plans for the Total Project. This applies to applications for commercial bank loans, construction loans, or project loans from a multilateral financial institution such as the World Bank, a financial intermediary that borrows for on-lending, or an export credit agency. In countries with rapid economic growth, new investments can be over half of the energy efficiency market. In these cases, strategies to increase investment incentives for energy efficiency components are likely to be more important than financing strategies.

The Mix of Local Currency Costs and Foreign Exchange Costs Affects the Type of Financing Required. Where there is a significant component of imported equipment and services in an energy efficiency project, a source of foreign exchange financing and repayment may need to be identified. In some instances loan repayments may be made in local currency, and the financial institution will take responsibility for obtaining foreign exchange, but the interest rate to the borrower is likely to be increased to reflect the currency risk. One way to maximize the local currency component is to encourage local equipment manufacturers to produce energy efficiency equipment. Thailand offers programs for energy efficiency equipment manufacturers that are described further in Exhibit 2-7.

Sufficient Creditworthy Demand for Financing Must be Demonstrated. Demand can be demonstrated either by developing projects that are large enough to meet the minimum size requirements of any given financial institution, or by identifying and creating situations where multiple transactions are likely to occur. Brazil provides an example of the latter: its high cost ($0.14/kWh) of low-voltage electricity to commercial customers is causing building owners to seek out financing for commercial building retrofits (lighting and HVAC systems.) One HVAC engineering firm estimated that in Sao Paulo alone, such commercial retrofit projects could total up to $250 million. This presents a business opportunity for a commercial financial institution to develop a lease or loan product that can be used for multiple commercial building retrofits.

Current Conditions in Local Capital Markets also have a Significant Impact on the Ability to Finance Energy Efficiency Investments. A country with advanced local capital market conditions is more likely to offer commercial sources of financing for energy efficiency investments. In addition to capital availability, the more mature the capital markets, the more likely it is that medium- and longer-term financing will be available and possibly lower overall interest rates. For example, Chile has fairly well developed local capital markets, including long-term bond markets. As a result, municipalities were able to obtain lease financing from leasing companies for energy efficiency municipal lighting retrofits. Chilean leasing companies are able to offer attractive leasing terms because the leasing companies have access to funding from the Chilean bond market. In this example, the leasing company is acting as a lesser as well as a retail distribution agent.

Many countries do not yet have developed capital markets that can provide the required wholesale funds for commercial banks and other financial intermediaries from domestic sources. In these countries, local financial institutions must turn to external financing sources. Given the small size of energy efficiency investments, however, it is still likely that a local financial institution would be desirable in the role of intermediary and agent. Several examples of how local financial institutions are successfully acting as intermediaries for energy efficiency projects are described below.

- In India, the Industrial Credit and Investment Corporation of India, Ltd. (ICICI) has been working with the Asian Development Bank (ADB) and the U.S. Agency for International Development for over five years to strengthen its management's ability to support energy efficiency projects and to act as an agent bank for ADB in the development and commercialization of energy-efficient technologies. For example, ICICI is financing a waste heat recovery project in the cement industry. The project has a total power capacity of 2.2 MW at a cost of $3.5 million. Of the 2.2 MW, 1.6 MW will be generated from recovered heat.

- In Poland, Landis & Gyr is in the final stages of obtaining commercial bank financing with the support of EBRD for a district heating project in a town with a population of 38,000, of whom 20,000 are connected to district heat. The project will upgrade boilers and heat exchangers, install a full metering system, and shut down polluting local boilers. The efficiency gained will allow a further 8,000 consumers to be connected to the system, generating additional revenues, which will repay the financing. The atmosphere of the town will benefit by substantial reductions in CO_2, SO_X and NO_X emissions. The construction will take about 18 months and the benefits will accrue over approximately 8 years. The financing, structured for this time frame, is sourced from commercial banks, with support from the industrial partners and EBRD. Landis & Gyr has stated that "the management time committed to this project was not proportional to the commercial benefits, but was considered justified in an early stage of market development."

- In Hungary, the Energy Savings Office of the Magyar Hitel Bank has been making energy efficiency loans since 1987 with funding from the German "coal aid" fund (see Exhibit 3-1).[7] In this case, a revolving fund proved to be an effective strategy for promoting energy efficiency. Cooperation among technical and financial experts improved the quality and cost-effectiveness of the loan review process. Restrictions on the use of the funds by the donor agency provided critical direction to the program. In addition, Magyar Hitel reported that training for their personnel on how to evaluate energy efficiency loans was essential in developing the capacity within the bank to administer the fund.

[7] The figures in this case were calculated based on the following exchange rates: 1991 exchange rate of Forints per US dollar = 74.735; 1994 exchange rate of Forints per US dollar = 105.16. Period average as given in *International Financial Statistics Yearbook 1995,* by IMF, p. 429. 1995 exchange rate is 135 forints/US$, from *The Economist,* November 4, 1995, p. 116.

EXHIBT 3-1
MAGYAR HITEL BANK ENERGY SAVINGS OFFICE

Program Objective: Using German Coal Aid funds earmarked for an energy efficiency revolving fund, the Magyar Hitel Bank Energy Office makes loans to various energy end-users for energy efficiency investments.

Key Organizations:
- Magyar Hitel Bank (MHB)
- Energy end-users

Financing Mechanism: A revolving fund established with assistance from the German Coal Aid Fund (this also complied with a restriction of the provision of aid). In 1991 the fund was valued at approximately $13.4 million; it has subsequently grown to almost $29.6 million.

Program Description: MHB administers an energy efficiency loan program funded from German coal aid to Hungary. Sixty percent of these funds, or almost $13.4 million, were earmarked to establish a mechanism that would finance energy efficiency investments. Since its inception in August 1991, 430 applications were processed by MHB, resulting in loans totaling $40 million. There have been only two defaults to date.

One of the unique features of the MHB revolving fund is a loan review process that puts loan applications through parallel technical and credit reviews. The technical review is conducted by a jury of specialists drawn from several institutions in Hungary, including several engineering institutions. Their activities are funded by a 0.5% fee assessed on each loan. The credit review is conducted by branch office bank staff using a set of standards and procedures for evaluating energy efficiency loan operations that was developed by bank staff at the central office. The bank seeks a three-year payback on the investment and requires three years of audited financials and 200% asset coverage.

The most significant aspect of the lending criteria is that the savings have to be demonstrated in the form of lower energy usage. Specifically, a prospective borrower needs to demonstrate to the bank that its project would save 500 gigajoules for each HUF 1 million ($6,500 at current rates) lent, and that at least one half of the funds will be applied in pursuit of energy savings. There is no concession made to monetary savings alone.

The bank's lending rate is 50% of the floating rate charged by the National Bank of Hungary (German Coal Credits require lending below market rate), currently 28%, plus a 3.5% spread. There are two tiers of interest rates: the first tier, or regular rate, is now 18% (50% national bank base rate of 28% plus margin of 3.5% plus 0.5% technical review fee); a second tier rate, carrying a risk premium of 3%, exists for projects with a payback exceeding five years or with additional technical or credit risk. The maximum lending limit is HUF 50 million and the bank will allow an 85:15 debt-to-equity ratio. Money can be lent for a maximum of eight years on a term loan basis, with a two-year grace period. A 0.5% commitment fee is charged.

Lessons Learned:
- A revolving fund can be a very effective strategy for promoting energy efficiency.
- Cooperation among technical and financial experts improves the quality and cost-effectiveness of loan review.
- Restrictions established by bilateral donors can provide critical direction to local programs.
- Training for MHB personnel was essential in developing the capacity within the bank to administer the fund.

In each of the examples mentioned above, a local commercial financial institution was responsible for playing a different and important role in delivering financing for energy efficiency.

A major barrier to increasing the use of commercial sources of financing for energy efficiency financing is posed by weak end-user creditworthiness. The end-user is the primary payer on most financing for energy efficiency investments. Even where performance contracts are used so that payments are based on measured savings, the end-user credit is material. Unlike power projects, which generate energy sales revenues, energy efficiency projects generate a stream of savings. The ability to secure financing still derives from an end-user's ability and willingness to pay. End-user credit can pose challenges of access to capital and transactions costs. Strategies to manage end-use credit risk must address both of these issues.

3.2 Application of Leasing to Energy Efficiency Financing

Leasing is an important financing structure that is comparable to borrowing money. It allows the user of a leased asset (the *lessee*) to avoid using capital up-front to acquire the asset. A typical structure for leasing equipment is the finance lease, also referred to as a "capital lease" or installment purchase agreement. Under a finance lease, repayments for up to 100% of the equipment and/or project costs are spread out over the lease term. The lessee usually has an option to take title to the equipment at the end of the term. Exhibit 3-2 depicts a typical finance lease structure. There are many advantages to leasing. The lessee's requirements for initial cash are minimal or none. A second advantage is that the lease may be structured so that cost savings will be greater than the lease payments, thus generating a positive cash flow for the lessee. Finally, lease contracts can be structured flexibly to be combined with other financing sources or to provide up to 100% of the total financing.

Leasing can be used to finance virtually all types of energy efficiency equipment over the full range of project sizes that energy efficiency presents in various sectors, from large industrial projects such as heat recovery or cogeneration, to small, mass-market programs such as compact florescent lighting or power factor correction capacitor installations. Leasing can be used for residential appliances, building control systems, or HVAC systems.

The legal, tax and accounting treatment of leasing varies widely from country to country. Many countries have taken steps to encourage leasing. These include allowing lessors to retain priority liens on equipment, protecting the rights of lessors to repossess in the event of default, clarifying tax treatments when equipment ownership and use are separated between parties, permitting lessors to assign lease payments and other rights to their lenders, and setting appropriate minimum capital and maximum debt leverage limits for leasing companies.

Despite growth in lease financing, leasing remains largely untapped as a source of financing for energy efficiency projects, particularly in the developing world. But this is likely to change. There are at least four reasons for pursuing lease financing for energy efficiency transactions and programs. The first is that lease financing is a useful financial mechanism for accommodating the credit issues related to smaller-size investments and small businesses. Second, lease financing structures can be included as part of energy efficiency programs involving other players, such as energy service companies, vendors, or electric utilities (these actors are

discussed in Chapters 4, 5, and 6, respectively). The remaining two reasons are addressed below:

Lease Financing Represents a Potentially Large Source of Funding. Equipment leasing is an important source of capital for new investments, financing approximately one-eighth of the world's new plant and equipment each year. The United States is by far the world's largest leasing market, representing over 40% of the total (more than $125 billion in lease financing closed in 1993.) The U.S. leasing industry is considered mature, while leasing in many other countries is a relatively new business.

The maturity of leasing in the United States is partly reflected in the type of equipment leased. For example, 22 years ago it was difficult to obtain lease financing for telephone systems. Like energy efficiency equipment, phone systems pose problems of insufficient collateral value: the systems are hard-wired into a building, making their removal expensive and difficult, and the cost of installation is high. But, also like energy-related equipment, phone systems are essential to a business' operation. Financing institutions eventually began to provide lease financing for phone systems because the industry became very competitive and participants needed to locate new types of transactions. A similar trend occurred with other technologies as financial institutions expanded their lease financing activities beyond the traditional asset-based areas.

Lease Financing Structures are being Used Successfully for Energy Efficiency in the United States and Existing Models can be Replicated or Adapted to Other Countries. A large portion of energy efficiency projects in the United States is now financed on a lease basis. Today, such companies as GE Capital, CIT Financial, BankOne and Citicorp aggressively market lease financing services for energy efficiency equipment. U.S. energy efficiency companies often use leasing to sell their equipment and turnkey project services.

Although the leasing markets of many countries are not nearly as large as that of the United States, they are growing as leasing is increasingly used as a way to finance equipment purchases. Almost half of the countries listed as the top 50 leasing markets by the *World Leasing Yearbook* are developing countries and emerging economies, and account for an estimated 15% of the total world annual leasing volume of $310 billion.[8]

The Latin American countries of Brazil, Chile, and Colombia had leasing markets of $6.6 billion, $750 million and $1.0 billion, respectively, in 1993.

- ***Brazil.*** Brazil's leasing market is centered mostly in Sao Paulo and began with leasing vehicles, but has moved to other types of equipment, such as computers. The future potential for leasing in Brazil is good, especially with reduced inflation and continued economic growth.

[8] *World Leasing Yearbook*, 1995. In descending order of market size, these countries include Korea, Brazil, Indonesia, Mexico, South Africa, Colombia, China, Turkey, Taiwan, Venezuela, Chile, Malaysia, Czech Republic, Hungary, Thailand, India, Pakistan, Morocco, Bangladesh, Philippines, Peru, Slovenia, and Poland.

- ***Colombia***. Here, an investment tax credit, similar to the tax credits formerly available in the United States, has spurred the market for leasing. As a result, nearly 16% of new capital investment is financed by leasing in Colombia. The ability to shift the benefits of the tax credits among different parties favors the use of leasing over other types of commercial lending.

- ***Chile.*** Chile represents a potentially attractive and dynamic market for leasing. In 1993 the Chilean leasing industry generated more than $750 million in business, a sixfold increase over 1987. The market penetration rate of leasing is estimated at 20% (the percent of new equipment and machinery financed by leasing). Some of the factors contributing to the growth of the leasing industry include:

  - Market acceptance of leasing as a financing mechanism
  - Multiple sources of funding available to leasing companies
  - Approximately 25 established leasing companies in Chile; half are subsidiaries of banks
  - Expansion of marketing outlets to include both suppliers of equipment and machinery as well as bank branches
  - Development of products especially designed to meet the credit demands of small and medium-sized companies.

  The Chilean Development Corporation (CORFO) administers a credit program that provides funding to Chilean leasing companies. Since 1990 the World Bank and InterAmerican Development Bank have made more than $565 million available to CORFO for forward lending to leasing companies.[9] The funds are allocated through a system of bidding that puts out offers of a particular sum and a range of terms, including fixed or floating interest rates. Leasing companies that have an A credit rating from two private risk-analysis companies are eligible to bid. (All leasing companies are regulated by the Superintendency of Banks and Financial Institutions or the Superintendency of Securities and Insurance.) The funds are awarded to the companies that offer the best rates exceeding an acceptable minimum.

  Chilean leasing companies can also issue long-term bonds with 4 to 12 year maturities. These bonds can be purchased by Chile's private pension fund management companies. Chile's pension funds have assets of $24 billion. The large size of the pension fund assets are a good indication of the depth of the medium and long term capital markets in Chile.

  An example of energy efficiency leasing in Chile is the Energy Efficiency Street Lighting Project in Antofagasta. Leasing companies bid to provide project financing to municipalities. A separate bid was put out for the installation of the equipment. After installation, the leasing company paid the installer and collected monthly payments from

[9] Personal communication, Roberto Hempel, Gerente Intermediacion Financiera, Coporacion de Fomento de la Produccion Chile, December, 1995.

the municipality. Repayment of the full cost took 17 months and was covered by energy savings. At the end of the lease period the municipalities owned the equipment. The leasing companies charged an average interest rate of 12%. Similar projects were carried out in over 150 municipalities throughout Chile.

Several Asian countries, including Indonesia, Korea, Philippines, India and Bangladesh, also have active leasing markets.

- ***Bangladesh.*** In this country, the average lease was about $58,000, indicating that this is a suitable financial mechanism for reaching small and medium-sized borrowers.

- ***Indonesia.*** Indonesian leasing companies are able to access domestic capital markets by issuing stocks, bonds, and commercial paper that can provide a source of medium-term financing. The leasing market in Indonesia provided $3.2 billion of lease financing in 1993. The fact that there are 159 leasing companies operating in Indonesia indicates that competition among leasing companies is strong.

- ***Korea***. With a leasing market valued at over $6 billion, Korea is considered to have a well established market.

- ***India***. India has a well established equipment leasing industry that is growing rapidly. Because of the priority the Indian Government places on the energy sector, tax policy currently allows 100%, one-year accelerated depreciation for energy equipment, including efficiency and renewable energy equipment. This policy is encouraging leasing companies to make energy a target market.

Credit Issues. The primary risk associated with lease financing is the lessee's credit risk. For large transactions, lenders or lessors evaluate the lessee's credit directly. For small transactions, they may rely on a financial intermediary to perform the credit analysis. Credit evaluation criteria can be established in advance. A discussion of credit enhancement techniques is included in Chapter 7.

Where an energy efficiency financing program will generate large numbers of small financings, transactions can be pooled together and a portfolio or statistical approach to credit analysis becomes possible. In this case, the nature and extent of credit analysis must be modified to manage transaction costs. For example, a local commercial bank may provide lease financing in amounts ranging from $5,000 to $25,000 for energy efficiency projects in the small commercial sector. The default rate for this class of customer, in general, may be in the 2% to 5% range per year. If sufficient numbers of transactions are generated, say 500-1000 for a total portfolio of $5-$10 million, then the statistical approach to credit becomes valid.

The large number of small transactions can become a virtue from a credit analysis point of view: no single default can cause the lender to fail to recover principal. The estimated default rates can be planned for in the structure and pricing of the overall program. Reserves can be established and their cost built into the lease pricing. Alternatively, the commercial lender can advance a fraction of the value of the portfolio; say 80% to 90%, to the leasing company,

creating a prudent margin or "coverage ratio" between estimated portfolio revenues and the revenue level needed to meet debt service payments.

The portfolio approach to credit works best where there are many transactions, each of which is small in size. This approach will be applicable in countries where the demand for efficiency improvements is high enough to generate a significant number of transactions.

Collateral and "Essential Use." One of the constraints to using leasing for energy efficiency relates to the collateral value of the equipment. Leasing is most commonly used to finance equipment with intrinsic collateral value, such as computers, construction machinery, airplanes, ships, vehicles and other types of rolling stock. The equipment leased or purchased in energy efficiency projects, however, frequently offers a different type of collateral value. This is so because the equipment, once installed, is often difficult to remove and offers uncertain resale value. Exceptions to this include small-scale power equipment, cogeneration equipment, and steam, chiller and refrigeration systems. In addition, engineering and installation costs in energy efficiency projects frequently account for a high portion of the total project's cost. To accommodate these constraints, a finance lease structure for energy efficiency equipment must be secured based on the creditworthiness of the lessee or the structure of the overall leasing program, and not exclusively on the asset value of the equipment.

Although certain energy efficiency equipment may have uncertain collateral value, it is still of value to the lessor to obtain a security interest in equipment whenever possible. Energy efficiency equipment provides services to building tenants and users of facilities that are essential to their operations. If a lessee defaults on its payment obligations under an energy efficiency financing, a security interest may also allow a lender to deny access to or use of equipment, even if it is not repossessed.

For example, in commercial efficiency applications, if the building in which the improvements are installed is foreclosed, vacated or sold, and if the building itself is viable (in a good location and well-constructed), then it is likely that the building will be re-occupied by another owner or tenant. This new owner or tenant will then use, and benefit from, the efficiency improvements made by the prior, defaulting owner/tenant. Financiers with a perfected security interest or mortgage waiver can require the new owner or tenant to assume the remaining payment obligation as a condition of their use of the building, and thereby recover the loss due to default.

This principle holds with commercial and residential facilities, but may not apply to special-purpose industrial facilities.

Combined with Other Programs. Leasing can be provided by utilities in support of demand-side management programs, or offered by vendors as a method of selling their equipment. The lessor makes no warranties on the fitness or performance of the equipment, but assumes the credit risk associated with the lessee's payment commitment. Leasing can be combined with energy services contracts. Equipment warranties, operations service and system performance guarantees can be provided by the energy services company or the equipment vendor. Combining leasing with other financing programs is described in more detail in Chapters 4, 5 and 6 on ESCO finance programs, vendor finance facilities, and utility finance programs.

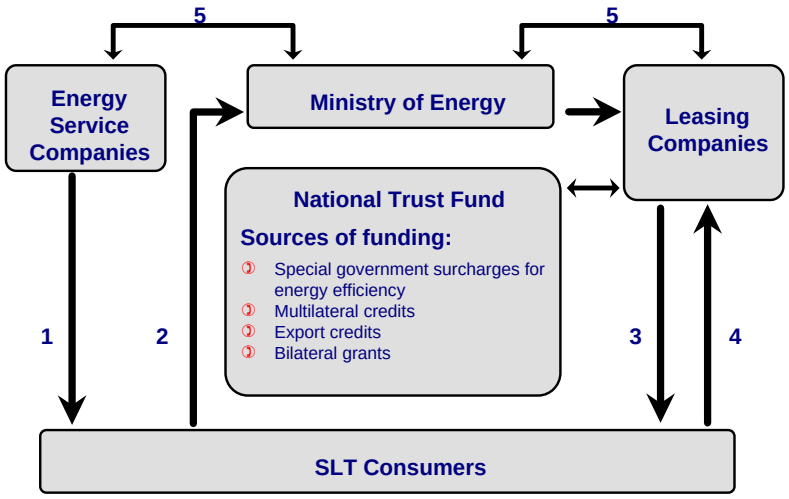
Examples. One example of lease financing that was successfully applied to a small-scale energy efficiency technology is the case of Asian Electronics Ltd. (AEL), which leased capacitors to an Indian State Electricity Board. By leasing the capacitors, the Board avoided making a significant capital investment in capacitors, while still benefiting from the improved power factor and voltage profile the capacitors produced (Chapter 5 contains a more detailed description of this case).

In Chile, a municipal lighting retrofit project in Antofogasta was used as a demonstration project that was later replicated in over 150 cities. Apparently the demonstration project was financed through a short-term lease, and over 45 Chilean cities have elected to use lease financing to implement their municipal lighting retrofits.

Ghana's Ministry of Energy has created a National Sustainable Energy Trust Fund to provide financing for energy efficiency and small-scale renewable energy projects (see Exhibit 3-3).[10] The Trust Fund has been capitalized with US $1 million from the World Bank and also receives monies collected by the nation's utilities from the power factor penalty. These monies will be used on a revolving-fund basis. Special emphasis has been placed on providing financing for capacitor and other power factor correction projects in the industrial sector. To administer the finance program, the Trust Fund is contracting with an established private leasing company. The leasing company originates the financing and handles the billing, collecting and record-keeping functions. Recipients of energy audits performed by the Ministry of Energy, including those supported by the World Bank's ESMAP (Energy Sector Management Assistance Program), are now being referred to the Trust Fund for project financing. The availability of Trust Fund monies is motivating several local engineering companies to develop projects that would utilize lease financing for their projects.

[10] Sources for this example are: Government of Ghana, Ministry of Mines and Energy, *Trust Deed:*
Trust Fund for Sustainable Energy Development, draft, July 1995. World Bank, *ESMAP Good Practices Case Study: Energy Efficiency and Conservation in Ghana*, 1995. Amar, Amarquaye, Industry and Energy Unit ESMAP Program, World Bank, Washington DC, personal communication, July 1995.

Ghana's Lease Trust Fund:
Transaction Structure



Legend:

1. Identification of client needs.
2. Request for financing of equipment.
3. Equipment lease.
4. Lease rental payments.
5. Performance contracts.

3.3 Strategies for Obtaining Energy Efficiency Lease Financing

What will it take to mobilize the leasing industries to deliver capital to energy efficiency projects? There are a number of recommended actions that can be taken to promote the use of lease financing in such projects, as follows:

- identify countries
- increase awareness
- find partners and organize the market
- recommend policy changes.

Identify Countries where Lease Structures may be Appropriate. Several countries have already been mentioned as good candidates for energy efficiency leasing programs. These are nations with already established (several hundred million dollars) and still growing markets for leasing, and whose laws allowing leasing are established. Generally, these countries have at least ten, and frequently many more, leasing companies operating. In many cases leasing is conducted by subsidiaries of commercial banks. At least 24 countries fall into this category: Korea, Brazil, Indonesia, Mexico, South Africa, Colombia, China, Turkey, Taiwan, Venezuela, Chile, Malaysia, Czech Republic, Hungary, Thailand, India, Pakistan, Israel, Morocco, Bangladesh, Philippines, Peru, Slovenia and Poland. A list of leasing companies operating in these countries can be found in the *World Leasing Yearbook* or other reference sources.

The absence of a large leasing market does not necessarily preclude the possibility of promoting leasing as a strategy to increase the financing available for energy efficiency. Ghana, cited above, is a good example of a country where leasing is not a significant industry, but was selected as the most appropriate vehicle for energy efficiency financing.

It is important to identify countries where the commercial laws can accommodate leasing transactions and eliminate countries where the likelihood of transacting leases is low.

Increase Awareness among Leasing Companies. An often-cited barrier to introducing efficiency measures to energy end-users is the lack of awareness of such technologies or measures. A similar barrier can exist with financiers who are unfamiliar with energy efficiency technologies and the ways in which they can be financed. Raising awareness of the energy efficiency market among financial institutions is a first and important step in applying established financing mechanisms to the energy efficiency market, and a way of encouraging and assisting leasing companies to enter this particular market niche.

The best way to increase the awareness of financial institutions is to bring new business to their attention; demonstrate, if necessary, how to structure the transaction; and indicate where such business and financial structures have been successful in the past. Frequently, when a financial institution is asked if they are interested in financing energy efficiency projects, they respond, that yes, in principle, they are interested. They might add that they don't receive very many requests for such financing or that they are unaware of how to approach this type of project. As a response to the statement that they don't receive enough financing requests, it is recommended that additional project identification and deal brokering be done. Facilitating introductions between financial institutions and companies that are active in energy efficiency project development and are seeking financing for specific projects can also be worthwhile. One way this can be done is by organizing workshops and seminars that are targeted to financial institutions, project sponsors and project developers. Working cooperatively with leasing associations is another suggestion. Many countries have leasing associations that could emerge as important resources.

Technical assistance to energy efficiency and leasing companies is recommended as a response to the absence of knowledge on how to evaluate energy efficiency financing requests. Training can be provided to energy service companies, energy end-users, and financial institutions on methods of lease financing for energy efficiency projects. The special issues in marketing, underwriting and assessing risk in energy efficiency financing would receive particular attention. Transferring certain components of model contracts, to the extent that they are not considered proprietary, is recommended. Such contracts can then be modified to accommodate the specific legal and regulatory situation in each country and the specific type of energy efficiency investment being considered. These contracts include the lease agreement, energy service agreement, turnkey equipment installation contracts, and collateral security documents.

Energy efficiency transactions that have already been closed, either in the same country or in different countries, should be highlighted so that leasing companies are made aware that a track record of completed transactions exists. Most financial institutions respond well to

evidence that the type of transaction being promoted has been done before and has been profitable for the financial institution.

Find the Most Suitable Partners (Stakeholders) and Organize the Market. One of the most important tasks is to find the most suitable partners to promote lease financing and to ensure that these partners have the right incentives and funding to undertake the recommended actions. The most suitable partners will be different in each country. Possible partners include U.S. leasing companies, the International Finance Corporation (IFC), donor agencies, multilateral development banks, electric utilities, equipment vendors, and local financial institutions.

U.S. Leasing Companies. The experience of U.S. leasing companies active in energy efficiency financing could be very useful to leasing companies in other countries. GE Credit, CIT Financial, Citicorp and others could expand their energy efficiency programs into new countries. If U.S. leasing companies are unable to expand, they could still be very useful parties to relate how and on what basis they made a decision to add energy efficiency to their leasing activities in the United States.

International Finance Corporation. The IFC's portfolio of some 50 leasing company investments provides a base of contacts to leasing company decision makers. The IFC's catalytic role has frequently included bringing together domestic sponsors with foreign financial and technical partners to assist in promoting sound operational and management practices, and advising governments on tax, legal and regulatory matters to break down institutional barriers to leasing through reforms. The IFC could consider an energy efficiency leasing program as part of its own efforts to promote energy efficiency or as a method of marketing the financial services of its proposed Renewable Energy and Energy Efficiency Fund.

Multilateral Development Banks. Both the IFC and these banks are good sources of long-term capital for existing leasing companies in countries where medium- and long-term capital is unavailable. Many developing and transitioning economies face a shortage of domestic capital for investments of any type. If interest rates are high as a result of capital rationing, then usually only those projects with the quickest payback and greatest return for a limited amount of risk are undertaken. Many potentially profitable projects are not implemented because sufficient capital is unavailable. Market research indicates that the provision of long-term (five to ten years) lease financing can make a difference in the number of energy-efficient projects that are implemented. Although some energy efficiency projects have very short payback, other projects often need longer terms to be financed on a positive cash flow basis.

The multilateral development banks are a logical source of long-term financing since the provision of longer-term capital and economic development are specific mandates. Long-term capital could be provided through arrangements with existing leasing companies by providing special financing facilities for energy efficiency. Such a program, which is discussed further in Chapter 7 on special-purpose energy efficiency funds, could be a first step towards a later refinancing by wholesale commercial sources of financing (e.g., bonds, commercial bank loans).

Utility Companies, Equipment Vendors, and Energy Service Contractors. Leasing can be applied effectively to support energy efficiency project development programs sponsored by these parties. Leasing can be combined with energy services contracts. The lessor makes no warranties on the fitness or performance of the equipment, but assumes the credit risk associated with the lessee's payment commitment. Equipment warranties, operations service and system performance guarantees can be provided by the energy services company. Leasing can be provided by utilities in support of their energy efficiency/DSM programs, or offered by vendors as a method of selling their equipment.

Donor Agencies. Support from donor agencies could focus on building the capability of local financial institutions. This can be done through training programs for bankers on energy efficiency and loan evaluation, by developing manuals for widespread distribution, by providing financial institutions with the latest information on technologies and projects, and through working with local financial institutions that act as fund administrators and intermediaries for international financial institutions.

Recommend Policy Changes to Promote Leasing. In some instances there is a role for governments to intervene in the market. The case of India, which currently allows 100%, one-year accelerated depreciation of renewable energy and efficiency equipment investments, has demonstrated the effectiveness of special tax incentives. Leasing companies interviewed in India indicate that this provision has stimulated their financing activity in this area and raised their profile considerably. Abuses and tax-driven deals are bound to result with such aggressive incentives. Some reforms to India's program are anticipated, such as eliminating the accelerated depreciation on sale/leaseback transactions, but the general provision is expected to remain, reflecting the high priority placed on the energy sector. Other policies that support leasing include allowing lessors to retain priority liens on equipment, protecting the rights of lessors to repossess in the event of default, clarifying tax treatments when equipment ownership and use are separated between parties, permitting lessors to assign lease payments and other rights to their lenders, and setting appropriate minimum capital and maximum debt leverage limits for leasing companies.

Chapter 4 Performance Contracting

Performance contracting is frequently employed in the financing of energy efficiency projects. It has been widely used in the United States and Europe (where it is called third-party financing), but is relatively new in developing countries and emerging market economies. In performance contracting, an end-user (such as an industry, institution, or utility), seeking to improve its energy efficiency, contracts with an energy service company (ESCO) for energy efficiency services and financing. Several contract and financing structures can be used and are described in this chapter.

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

The essence of performance contracting is that some part of the contract is based on the ESCO's performance in achieving energy savings. Contracting based on performance does not necessarily have to be undertaken by an ESCO, but in practice, ESCOs have been the pioneers and major users of performance contracting for energy efficiency projects.

Performance contracting represents one of the ways to address several of the most frequently mentioned barriers to investment. Performance contracting through an ESCO transfers the technology and management risks away from the end-user to the ESCO. For energy users reluctant to invest in energy efficiency, a performance contract can be a powerful incentive to implement a project. Performance contracting also minimizes or eliminates the up-front cash outlay required by the end-user. Payments are made over time as the energy savings are realized.

Efforts to apply the ESCO model of performance contracting in developing countries are still relatively new and perhaps it is too soon to predict this model's long-term applicability and replicability. Over the short term, the results have been mixed. Several companies have committed to investments only to pull out of them at a later date; other ESCOs have conducted initial business development and concluded that the development costs were too high, the financing unavailable, or the risks unmanageable. Some companies have been successful and have executed multiple performance contracts. Two examples are EPS in the Czech Republic and Intesco in India; both are U.S. ESCOs operating overseas with joint venture partners. A description of one of EPS' projects using performance contracting in the Czech Republic is described in Exhibit 4-3.

One hypothesis for why the success stories are few is the mismatch between the skill mix and resources of U.S. ESCOs and the requirements of doing business in developing countries and emerging economies. Many U.S. ESCOs are small and medium-sized business with relatively short track records operating outside of the United States, and as small businesses, many of them lack the financial resources to sustain high market-entry costs. Another reason that performance contracting is not widespread outside of a few countries is that the fundamental concepts behind performance contracting are new and will take time to learn. In addition, most of the time, the contracts need to be adapted to conform to country legal requirements.

4.1 The Role of Energy Service Companies

ESCOs have long been active participants in the U.S. market for energy efficiency by acting as both project developers and marketers. However, U.S. ESCOs have only begun to undertake business development activities in emerging market countries in the last several years. ESCOs have identified the lack of financing, especially for terms of 5 to 10 years, as a major barrier to implementing projects outside the United States. They are also finding that the sales, marketing and project development costs are quite high, due in part to the high risk of project cancellations and delays, and the lack of familiarity among energy users with the concepts of performance contracting.

Companies approach the energy efficiency business from a variety of skill bases. Engineering firms, mechanical and electrical contractors, equipment vendors and manufacturers, and other trade allies offer various types of energy efficiency products and services, and market to end-users. An ESCO, by definition, offers a complete turnkey package of energy efficiency services, including energy auditing, feasibility study preparation, performance contracting, brokering financing, specialized contract documents, and marketing skills.

In some cases ESCOs provide financing for projects from their own funds; however, they generally are only able to finance the initial stages of a project. More often, the ESCO's role is to arrange financing for its customers with leasing companies, institutional investors and commercial banks. In doing so, ESCOs assume certain risks for system performance and energy savings via extended warranties, guarantees or performance-based compensation arrangements where the end-user's payments are a function of verified energy savings.

ESCOs have been most effective in delivering energy efficiency services to larger commercial, industrial and governmental/institutional end-users, and to end-users with large and stable energy loads. Generally if the ESCO is to be profitable, it must develop projects of a minimum size. The minimum size will vary, but typically ranges from $250,000 to $1 million in total project capital costs. However, some ESCOs have been effective in implementing small commercial, industrial and residential projects for utilities where the utility has organized the market or acts as the payor. This allows the ESCO to achieve economies of scale in service delivery on small projects.

Some ESCOs market their services by undertaking projects for low-cost or no-cost (operations and maintenance) types of efficiency measures that have quick paybacks. This allows the ESCO and the end-user to move directly into implementation by taking advantage of immediate energy savings opportunities that require little financing. The ESCO and the end-user are able to build a trustworthy relationship, a necessary element in performance contracting. ESCOs pursuing this strategy are typically fee-for-service engineering companies that are just beginning to expand into project implementation and performance contracting and need to establish a track record.

ESCOs require working capital from banks and/or equity partners to undertake small, low-cost/no- cost improvements for their customers. As they graduate to larger projects, ESCOs require sources of project financing for their customers.

4.2 Types of Contracts Used by ESCOs

For ESCOs, projects are typically implemented using two general forms of contracting, both of which are performance-based:

- ▸Performance based contracting for energy services only
- ▸Performance-based contracting for energy services and financing.

Several types of performance-based contracting are commonly used: guaranteed savings, shared savings contracts, paid-from-savings contracts, utility DSM contracts, energy/output sales agreements, and performance leases. These are described below. The guaranteed savings contract is the most popular type of performance-based agreement.

Under the *guaranteed savings contract for energy services*, the customer enters into separate agreements for energy services and for financing. Typically the ESCO may arrange financing, but is not a party to the finance agreement. Financing on a full-recourse basis is provided to the energy user based upon the strength of the energy user's balance sheet. The structure of these agreements is depicted in Exhibit 4-1. The ESCO and the end-user enter into a turnkey contract or "energy services agreement" whereby the ESCO provides engineering, equipment installation, and other services such as operations, maintenance, and savings verification. Under the energy services agreement, if the savings do not materialize as projected, the end-user has recourse against the ESCO. The second agreement, a financing agreement, covers the end-user's obligation to pay for the project's initial costs. It is typically fixed and unconditional; it is not contingent on or subject to offset based on actual energy cost savings. The ESCO may or may not be a party to the financing agreement. If it is party to the agreement, its role is only to pass the payments to the financier. The end-user credit risk is assumed by the financier, not the ESCO.

When *performance-based contracting with shared savings or paid-from-savings* is used, all obligations of the ESCO and end-user are typically wrapped into a single contract. This type of arrangement is shown in Exhibit 4-2. The end-user's payment obligation is calculated based on measured savings on a month-to-month or annual basis. The ESCO finances the project installation as part of its obligations. There are several variations of performance-based contracts that include financing, some of which are described here.

- ▸*Shared-Savings Contracts.* With a performance-based shared savings contract, savings are verified periodically (e.g., monthly, quarterly, annually) by the ESCO and the savings-based payment is subject to fluctuation. In most cases, a lender will require that the end-user assume responsibility for minimal hours of operation and minimum energy load levels. The energy prices used for calculating energy cost savings are often fixed, or at least are subject to a minimum value, thus removing energy price risk from the transaction. The ESCO remains responsible for project performance, including any on-going equipment servicing, maintenance and monitoring functions. The end-user's payments are typically set as a percentage of savings, up to 100%, for the contract term, typically 5 to 10 years. Special attention is paid to establishing clear, workable procedures for measuring energy savings.

- ▸*Paid-from-Savings Contracts.* A special form of a performance-based contract that incorporates features to mitigate performance risk is a "paid-from-savings" contract.

Here, the project's capital costs are explicitly defined. The customer makes payments equal to a share of savings

EXHIBIT 4-3
CZECH REPUBLIC: BULOVKA TEACHING HOSPITAL
(1995 - Present)

Program Objective: Bulovka Teaching Hospital is one of the largest hospitals in the Czech Republic. The hospital needed to upgrade its central heating system, but did not have the funding to do so. Increased energy costs resulting from the recent transition to market prices was putting upward pressure on operating costs. A performance contract with Energy Performance Services modernized the hospital's central heating system and helped reduce operating costs.

Key Stakeholders:

- ▸ Bulovka Teaching spital
- Landis & Gyr
- Energy Performance Services Czech Republic (EPS CR)

Financing Mechanism: EPS CR packaged US $2.7 million of energy efficiency measures into an integrated paid-from-savings program. Long-term debt financing for 100% of the project was secured through a Landis & Gyr corporate guarantee. The term of the performance contract includes construction time and an eight-year amortization period during which the hospital is guaranteed that the savings will cover all debt service payments. If the hospital decides to cancel the contract, it would pay a cancellation fee, which is pre-calculated based on anticipated revenues.

Program Description: Prior to the performance contract, the hospital complex had been heated with steam generated from its own central steam plant. The total energy bills were estimated at US $3 million annually. Steam generation accounted for 53%, electricity for 27%, and hot water for 20%.

The performance contract with EPS CR provided for four energy efficiency measures as part of the total project. Total project costs were $2.7 million. First, EPS CR closed the original steam plant and connected the hospital to the local district heating system. Second, an energy management system was installed that provides more precise control of indoor temperatures, hot water and space heating. Third, EPS CR installed a new system that preheats air coming into the building, taking heat from the output and transferring it to input air (replacing air handling units that were using 100% fresh air). Finally, the hospital's old steam boiler was replaced with a new 4-ton natural gas-fired boiler that now provides steam for sterilization and laundry purposes. The measures, operating together, are intended to produce an annual savings of approximately $700,000. The measures were put into operation in September 1995.

Lessons Learned: to eliminate all subsidies for fuels and energy by 1998 created an opportunity to convert technical energy savings into a positive cash flow.

Source: World Energy Efficiency Association.

This case illustrates the potential difficulties involved in business development. The project sponsors (EPS and Landis & Gyr) stated that the project was difficult to arrange. Long-term financing at reasonable interest rates proved difficult to secure. Financing was ultimately secured in hard currency, not Czech crowns, with a corporate guaranty from Landis & Gyr.

- The transition to market-based prices for energy and the intention of the Czech Government (e.g., 80-100%) that are applied to pay the project's operating and capital costs, with interest at a defined rate. When the project capital cost has been repaid, with interest, the contract either terminates, or continues but with a lower share (e.g., 25%) of savings being paid for the remaining contract term. Typically, a maximum contract term is defined that is longer than the expected time required to repay the project capital cost from savings.

  The Bulovka Teaching Hospital case described in Exhibit 4-3 is an example of a project that utilized a paid-from-saving contract. In this example, repayment of the financing for the $2.7 million capital investment comes from the anticipated $700,000 per year of energy savings. The financing was provided from commercial sources with a guaranty of repayment from Landis & Gyr, which provided management control and measurement equipment.

- *Utility DSM Contracts.* Here, the utility contracts with an ESCO to install equipment in the end-user's facilities and the utility pays the ESCO for verified, delivered kW and kWh energy savings, typically over a 7- to 10-year term. Special attention is given to energy savings measurement and verification protocols, which must be approved by the utility.

  Projects implemented under utility DSM contracts often include some contract with a payment obligation from the end-user as well. Financing for utility DSM contracts can come from several sources, but the utility's own capital is the primary source.

- ‣*Energy/Output Sales Agreements.* Under an energy or output sales agreement, the ESCO installs energy production equipment (for example, a small cogeneration plant, alternative fuel boiler, chiller, refrigeration unit or air compressor plant) in the energy user's facilities and sells metered electric and thermal energy or compressed air to the energy user for the contract term, usually 7 to 15 years. Projects are typically sized just for the end-user's loads; in some cases, excess electricity generated by the project may be sold to the local utility. Payments due under energy sales agreements are based on easily measured metered outputs; the end-user typically commits to minimum purchase provisions in the project contract. These types of agreements often include energy efficiency measures.

- ‣*Performance Lease.* Lease financing contracts can incorporate performance provisions. A simple technique is to include an extended equipment warranty within the lease and make lease payments contingent on the equipment functioning properly. If the project equipment is working, then the fixed payment is made. If the equipment fails, then payments are suspended. A notice of failure is given to the lessor or equipment vendor, and a cure period (e.g., 7-30 days) is allowed to restore equipment functioning. If the equipment is returned to service, then lease payments resume. If the failure continues past the allowed cure period, then the lease payment obligation is terminated. In this case, the value or amount of the payments is set when the lease is executed, unlike shared savings or other types of performance contracts where the amount of each payment may be determined based on measured energy savings. The vendor, and in turn the lessor (which may be the same party), bears the risk of performance. The end-user or lessee has assurance, similar to an extended warranty, that the equipment will work or the lessee will not have to make payments. A performance lease works well

when the equipment leased is simple (e.g., lighting, capacitors) and the vendor is involved with multiple installations, thereby spreading the risks and costs of equipment failure over many projects.

4.3 Financing for Performance-Based Projects

ESCOs seeking to use performance contracting must develop sources of debt and equity to finance their projects. Most ESCOs do not have adequate credit to secure financing for their customers without pledging the project's assets. Therefore, most financing for projects developed by ESCOs in the United States has been guaranteed savings, where financing is provided by financial institutions on a corporate financing basis with full recourse to the ESCO's customers. Sometimes financial institutions providing credit to ESCO customers receive guaranties of repayment from the ESCO or the ESCO's owners. Commercial banks and leasing companies in the United States have experience in this type of lending. Few banks outside of the United States and Europe have experience with energy services projects involving ESCOs. However, where the credit risk is that of the customer, it is often not necessary to undertake an in-depth credit analysis of the energy services project since the financing is not a non-recourse financing.

A smaller number of ESCO projects are financed using non-recourse or limited-recourse financing.11 This allows ESCOs and customers to develop projects that are much larger than their net worth. Although non-recourse financing has important advantages, it also introduces significant business risks into the financing, and only a limited number of institutions provide this type of project financing. Structuring a non-recourse or limited-recourse project financing for any investment is a time-intensive process, requiring extensive evaluation and comprehensive documentation.

Limited-recourse project financing is a hybrid between non-recourse project financing and financing based on the full faith and credit payment obligation of a single entity. Most project financing in developing countries is limited-recourse financing where there is some recourse to the project sponsors, especially during the construction period or for certain defined political risks. In energy efficiency projects, the ESCO can be considered the project sponsor.

Exhibit 4-4 is an example of a creative approach to securing adequate non-recourse financing. Through the creation of a special $30 million fund, Proven Alternatives Capital Corporation and Banque Paribas are able to develop projects that qualify for non-recourse project finance. Although each specific project must be approved by the bank, underwriting criteria have been established that serve to create a faster and less costly approval process.

11Non- and limited-recourse project financings are based on payments made exclusively from the cash flow of the project. Collateral security comes only from project assets. This type of financing involves the identification, evaluation, allocation, mitigation and management of risks associated with all project factors that affect cash flow. These risks pertain to the project technology, system performance, construction and operations costs, commitments to purchase project outputs or energy savings, pricing relationships between project costs and project revenues, and other variables.

EXHIBIT 4-4
PROVEN ALTERNATIVES CAPITAL CORPORATION / BANQUE PARIBAS FUND
(1994 - Present)

Program Objective: Proven Alternatives Capital Corporation (PACC) developed a $30 million fund with Banque Paribas to finance performance contracts. Target investments are commercial, industrial, and institutional energy efficiency programs and projects.

Key Stakeholders:
- Proven Alternatives Capital Corporation
- Banque Paribas

Financing Mechanism: The $30 million PACC/Banque Paribas Fund, underwritten by Banque Paribas, provides financing structured on a non-recourse basis, with the collateral security for each project's financing limited to the physical assets, contracts, and cash flow of the project.

Program Description: In 1993 Proven Alternative Capital Corporation, a merchant banking organization, organized a non-recourse financing pool for energy efficiency projects. This fund, currently performing above projections, pools many projects into one portfolio, thereby increasing the credit strength of the overall portfolio and reducing the interest rate. PACC's role includes fund administration, loan documentation, structuring customer contracts and negotiating non-standard approvals. The target investments for the PACC/Banque Paribas Fund include commercial, industrial, and institutional energy efficiency programs and projects. The minimum project size is $1 million, although smaller programs have been approved where additional considerations existed (e.g., it was the first project in the development of an overall program). To maintain the balance of the portfolio, $5 million is the maximum project size. Loan maturities range from 5 to 10 years.

Specific credit and technical criteria were established to create a relatively automatic and smooth approval mechanism. Programs that meet the pre-approved criteria are not required to go through a detailed approval process. This mechanism enables a rapid turn around time and also helps to maintain a low overall cost of capital. PACC first reviews the structure for pending investment opportunities; this ensures that projects submitted for financing will be approved either through the automatic mechanism or with as little additional review as possible.

PACC has developed a thorough underwriting and review process that identifies all key risks and eliminates or prices for these risks. This has expanded the market for investment opportunities, thereby allowing PACC to allocate fund expenses over a larger number of projects, lowering the fixed cost per dollar invested.

Lessons Learned:
- Establishing criteria for automatic approval is an important goal, but the process is still more cumbersome than necessary.
- Firm agreement of approval turn around time (with penalties) is critical.
- The originator of the project must have sufficient internal resources to support the required analyses.
- The fund should have a flexible funding mechanism for non-standard approvals and streamlined documentation requirements.

Source: Proven Alternatives Capital Corporation

The key risks, contract provisions, measurement and verification methods, security arrangements, costs, and financial plan and sources of financing are as follows:

Risks. Five types of risk are inherent in performance contracting:

Project Development Risk. This is the risk that the project won't be implemented even though funds have been spent on project development. Equity investors in the ESCO mostly bear project development risk.

Performance Risk. The principal performance risks associated with performance-based projects relate to engineering and system design and equipment performance. Engineering and system design risks address the risk that the project is properly engineered to achieve energy savings and that the design is appropriate to the end-user's applications and existing facilities. Equipment performance risk means that the new equipment can perform according to its specifications. The ESCO's experience, warranties, the reputation of equipment manufacturers, the performance history of previous projects, and engineering due diligence are the main methods for evaluating these *risks.*

Hours of Operation and Use/Load Risk. If the energy-consuming equipment is not used as projected, there can be no savings. The end-user must remain in operation with a steady or variable reduced demand for energy services. In general, end-users assume this risk.

Construction Risks. Lenders must be confident that the project will be constructed on time, within budget, and according to specifications.

Credit Risks. The customer's ability to continue to be a going concern and to meet its obligations for both energy services payments and loan or lease payments is a risk to both the ESCO and lenders.

***Contract Provisions*.** Seven key provisions are common to performance contracting:

- customer payment terms
- calculation of energy savings and verification procedures
- responsibility for customer hours of operation and end-use energy loads
- pricing of energy savings (if applicable)
- distribution of responsibilities for project equipment operations, maintenance, repair and replacement
- ESCO performance obligations, milestone commitments and liquidated damages/ liabilities for failure to perform
- ability of financier to cure any ESCO defaults and appoint a substitute manager and/or substitute new projects for non-performing projects.

Measurement and Verification Methodologies. Several methodologies for measurement and verification exist. The most important elements are that they allow for dispute-free, unambiguous calculations of savings during the operating life of the project. The development of standard procedures for the measurement and verification (M&V) of savings can help both end-users and the financial community to understand this key dimension of performance contracts. In the United States, significant experience exists in savings measurement and verification. The U.S. Department of Energy recently issued the "North American Energy Measurement and Verification Protocol" (NEMVP) providing the energy efficiency industry with commonly accepted guidelines for M&V procedures (see Exhibit 4-5). Assembling the performance and

payment histories of ESCO projects is an important aid for lender risk analysis. Another M&V methodology is to stipulate savings. Savings can be stipulated based on estimates and one-time verifications of equipment efficiency performed at project commissioning, thus eliminating performance risk for the project operations period.

Security. Security for performance-based transactions include:

- the ESCO's rights to payments and other commitments of the end-user (and, if applicable, the utility) made in the underlying contracts
- the project equipment
- the commitment of the ESCO to construct the project on time and within budget (this commitment may be backed by construction bonds)
- the ESCO's commitment to perform services during the operations period.

EXHIBIT 4-5
THE NORTH AMERICAN ENERGY MEASUREMENT AND VERIFICATION PROTOCOL

The measurement and verification (M&V) of the quantity of energy savings and energy cost savings is an integral component to the successful implementation of energy efficiency projects. Energy efficiency projects provide incremental cash flow not by adding a new source of revenues, but by reducing energy costs. The primary role of M&V procedures is to determine energy savings by comparing the baseline energy use with post-installation use. M&V procedures assume greater importance when the financing structure for an energy efficiency project is based on the level of savings achieved or the performance of energy conservation measures, e.g., performance contracting. A standardized approach to M&V procedures is of great advantage to all stakeholders.

In order to provide the energy efficiency industry with commonly accepted guidelines for energy efficiency M&V, a committee comprising government energy agencies, industry organizations and other national associations from the United States, Canada and Mexico developed the North American Energy Measurement and Verification Protocol (NEMVP). The Protocol addresses the concerns of financiers, sellers, buyers, and consultants involved in energy efficiency projects. It incorporates or is compatible with all other main protocols in this area, including the EPA's Conservation Verification Protocols. The NEMVP is intended to assist the parties to an energy efficiency project in developing successful M&V procedures, thereby enabling them to accurately quantify energy savings over time and to allocate the various risks associated with achieving energy and cost savings. The Protocol sets out procedures to verify, at varying levels of accuracy and cost, baseline and post-installation conditions and long-term energy savings performance. The Protocol addresses a variety of energy conservation measures including gas and electric measures, fuel switching, load shifting and installation of other energy-efficient equipment.

Source: U.S. Department of Energy. 1996. *North American Energy Measurement and Verification Protocol* Washington, DC.

Costs of Financing. Financing costs generally vary by the type of financing provided. For guaranteed savings contracts, commercial sources of financing are generally available at market rates and will be priced according to the credit rating of the energy end-user. In the United States, non-recourse financing for performance-based contracts is usually provided by subsidiaries of electric utilities, a handful of specialized financing companies, and a small number of well-capitalized ESCOs. Performance-based lenders will typically earn 13-18% on an

all equity financing, pre-tax basis. When debt financing is used, even at conservative debt/equity ratios, after-tax returns to equity can easily exceed 25%.

Financial Plan and Sources of Financing. As with financing costs, the financial plan and sources of financing vary depending upon the contract structure used. In a guaranteed savings arrangement, debt financing can be provided for up to 100% of the project costs. Sources of financing primarily include commercial banks and leasing companies. The financing structure for a non-recourse performance-based transaction needs to include a significant equity element as well as debt. Equity can come from the end-user, the ESCO or a third party. Approximately 10%-30% of the project's costs should come from equity, and the remainder from debt. If the project is financed using the customer's credit, the amount of equity required can be considerably less, and in some instances, no equity may be required if the customer has a strong credit position. The term of the debt must be no longer than the term of the end-user and utility contracts. Structuring the debt term for a shorter period gives additional security to the lender.

Obtaining a source of financing for non-recourse performance-based contracts outside the United States has been difficult for a number of reasons. First, lenders must familiarize themselves with the project's economics, engineering risks, contract provisions and security arrangements. Few local financial institutions have developed such capabilities, in part due to the lack of demand for an aggregated amount of capital. Those with project financing capabilities may be reluctant to develop them until they are confident that several transactions will materialize. ESCOs have thus turned to international financial institutions for financing. But many of these agencies have no prior experience with performance contracting either, and would be seeking projects of a certain size to meet their minimum project size requirements. Therefore, the absence of financing for performance contracting is a very real barrier to the development of ESCOs.

Financing for guaranteed savings contracts is likely to be more readily available since the underwriting process is much more simple. The availability of financing for guaranteed savings arrangements is dependent upon the creditworthiness of the customer, the customer's willingness to borrow funds for energy efficiency projects, and general market conditions for credit in a country.

In addition to the lack of debt, ESCOs may not have the necessary equity financing for project development and equity investments.

4.4 STRATEGIES FOR PERFORMANCE CONTRACTING

There are several strategies to promote performance contracting and ESCO development, including:

- ▸market development
- ▸locating sources of debt and equity financing for projects
- ▸dedicated debt facilities
- ▸standardizing contracts and protocols
- ▸conducting energy efficiency project procurements.

***Market Development*.** One method of facilitating ESCO development is to provide assistance to companies that are already established in related energy efficiency businesses. Assistance could be targeted to the development of new skills for existing ESCOs or for such other firms as energy management companies, energy engineering companies, or vendors. New specialized skills could be taught in contracting, financing, marketing and general business management. There are several ways in which such assistance could be provided. Two are mentioned here: bilateral donor technical assistance and joint ventures with foreign ESCOs.

USAID has provided technical assistance for ESCO market development in Hungary, Czech Republic, Bulgaria and Romania for several years. Assistance has included training in how to conduct energy audits, procure equipment (primarily energy measuring devices), financing, marketing and business management. Energy managers associations have also been created. Such assistance has been successful in developing a group of qualified ESCOs in each country. Donor assistance could also be very useful if some of the funds were targeted to local financial institutions to provide training on how to evaluate performance-based contracts and to structure debt facilities.

Another approach is to provide incentives such as grants for the development of joint ventures between ESCOs and local energy management companies. This benefits both ESCOs, which are unable to conduct business without local partners, and local partners, which can benefit from the transfer of skills. Many foreign companies may be able to finance their own training for local partners, although some government incentives would certainly be desirable.

Locating Sources of Debt and Equity Financing. Making *debt financing* available for ESCO projects is expected to have a significant impact on an ESCO's ability to market its services and implement projects. The private sector investment agencies of the multilateral and local development banks are good candidates to initiate finance programs for ESCOs. For example, the Industrial Development Bank of India has developed specialized energy efficiency lending programs and the International Finance Corporation is considering establishing a specialized fund for renewable energy and efficiency projects. While not designed specifically to assist with performance contracting, these funds could be oriented to performance contract structures.

Another potential source of debt for performance-based contracting is financial institutions in the United States that are already familiar with performance contracting but have not used such structures outside of the United States. Coupled with political risk insurance and other credit enhancement, these institutions may be willing to apply their specialized skills elsewhere.

Many energy efficiency businesses and ESCOs, both foreign and local, need working capital. Additional *equity* will greatly improve ESCOs' prospects to secure debt facilities, allow them to comfortably assume performance risks, and provide them with the working capital needed for project development. Many U.S. ESCOs are small businesses and quite entrepreneurial. Doing business outside of the United States requires that they have access to "deeper pockets" than they need at home. Project identification and development can take much longer in developing and emerging economies, and the risks are greater.

ESCOs can turn to various sources for equity financing. Venture capital firms, enterprise funds, equity funds, and strategic partners are all potential sources of equity. Strategic partners might include electric utilities, engineering firms, or financial institutions.

ESCO's would also benefit from access to project preparation and development funds. Sources of funding for feasibility studies, energy audits and the preparation of financing applications would increase their ability to secure additional information and decrease the amount of equity capital required.

Dedicated Debt Facilities. Dedicated debt facilities offering 80%-100% financing for projects could be established. A master loan agreement could be executed between an ESCO and a financier which would commit the lender to provide financing according to defined terms and conditions. Funds would be drawn down on a project-by-project basis. The balance of financing would come from the ESCO, the customer or another equity investor. Alternatively, the financier could provide 100% of project costs, including an ESCO construction profit; in this case, returns to the financier would need to be higher to reflect the higher risk. It is possible that a share of project profits could accrue to the lender in addition to interest payments.

The amount of financing extended to each project would be based on certain underwriting criteria and debt service coverage. Typical criteria concern project economics, end-user credit, performance risks, contract provisions, and target debt service coverage ratios. The financing structure may also include the establishment of reserve funds (e.g., six months of debt service, either capitalized or funded from project revenues) and full- or limited-recourse commitments or credit support from the ESCO.

A dedicated debt facility could be designed anticipating a target business volume over a stated period. Financiers will typically seek $20-30 million over a two- to three-year period as the minimum volume target. A minimum size for each individual project may also be defined consistent with the project's characteristics. To the extent that no single ESCO can demonstrate capital demand, the dedicated debt facility could be structured to benefit a group of ESCOs.

Several provisions could be used to strengthen the credit of the overall facility. For debt facilities with a single ESCO, cross-default provisions could be added where a payment default from one project could be made up by revenues from other projects. The lender will also retain the rights to cure problems if the ESCO fails to do so or defaults on its obligations to the end-user or utility. A lender may also want a "sweep" provision, which requires that a portion of project revenues above a target level (after the payment of debt service, O&M costs, and remittance of some level of profits back to the ESCO) be applied to the prepayment of debt. The last several features are not requirements for financing; rather, they are techniques that have been employed in prior project financings.

***Standardizing Contracts and Protocols*.** The development of standard procedures for the measurement and verification of savings as well as for standard contract terms can help both end-users and the financial community better understand performance contracting. The development of standard contracts has been an elusive task because various companies consider their contract approaches unique and proprietary. Rather than developing a single standard energy services agreement, the US National Association of Energy Service Companies, NAESCO, is now focusing on standard language for a set of key contract provisions, such as insurance, equipment ownership and purchase options, which will allow standard contact forms to be built up gradually. It would also be useful to have standard contract provisions that could be adapted for use in smaller-size projects. In terms of standardizing measurement and verification procedures, the US Department of Energy-

sponsored North American Energy Measurement and Verification Protocol described in Section 4.2 is recommended as a way to standardize the measurement and verification processes.

Conducting Energy Efficiency Project Procurements. Another method of promoting market development is to conduct procurements. Government agencies or utilities can identify and qualify customers with energy efficiency potential and, acting on behalf of a single customer or preferably a group of customers, undertake the procurement of turnkey energy efficiency equipment installation and services. The typical method is to develop and issue a request for proposals to the energy efficiency industry. Before issuing the RFP, the procuring agency could secure the customer's commitment to the program, assist the customer in defining its decision-making process and the acceptable range of financing and contracting terms, perform a preliminary analysis of the customer's creditworthiness, and assemble basic information on the energy cost, consumption and end-use characteristics for the customer's facilities. The RFP could define the proposal format, its evaluation and selection process. This preliminary work delivers to the ESCO community a qualified and "decision-ready" customer.

In effect, the procurement process aids in organizing the market and lowering barriers to implementing projects. This is the approach being taken in the Ukraine Energy Efficiency Procurement Program. The program, supported by USAID and the Ukraine Ministry of Energy and Power, is designed to mitigate business development risks and thereby foster the market for energy efficiency equipment and services. The risks associated with project development and financing are also addressed. USAID plans to provide capital grants for project equipment and targeted financial assistance for project development expenses. To prepare for the procurement, walk-through energy audits of the sites were conducted and energy cost, consumption, and tariff and load profile data were gathered. Background financial information on industries will be assembled in anticipation of requirements for credit analysis and financing.

Chapter 5 Vendor Finance Programs

Vendor finance programs offer a set of commercial finance techniques that can address some of the challenges of energy efficiency financing. Vendor financing works best in mass market applications to finance sales of common equipment with large numbers of end-users (e.g., industrial motors, commercial lighting). Sometimes, vendors form their own finance companies to serve these purposes, such as General Motors Acceptance Corporation or Caterpillar Credit Corporation.

A vendor finance program is a programmatic relationship between an equipment marketer (the "vendor") and a financial services company to provide financing at the point of sale. An equipment marketer may be the manufacturer, but may also be a distributor or retailer. The vendor becomes the motivated stakeholder behind the marketing effort, marketing financing in conjunction with equipment. The vendor assumes the responsibility for documentation and other administrative tasks, and shares in transaction costs. The vendor is also the "aggregator" of capital demand. The vendor may provide certain credit enhancements and, if sufficient numbers of transactions are pooled, credit can be evaluated based on the portfolio as a whole, saving in transaction costs and allowing credit to be extended to more end-users.

Contractually, there are two sides to a vendor finance program: 1) the agreement between the financier and the vendor, and 2) the agreement between the customer and the vendor. It is in the agreement between the financier and the vendor in which many of the challenges of financing energy efficiency projects are addressed.

This chapter describes the basic techniques used in vendor finance programs, beginning with a discussion of the two types of agreements. Applications of vendor financing for specific types of energy efficiency projects programs are also outlined.

5.1 The Vendor/Financier Agreement

A vendor finance program generally begins with the development of an agreement between the vendor and the financier. This agreement defines the financing terms that can be offered to the customer (e.g., rates, terms, documentation requirements), the procedures used to originate individual transactions under the program, and the terms of the relationship between the vendor and financier. This last issue generally deals with the manner in which the financier will assume the credit risks of the customers.

Financiers need a steady flow of creditworthy customers and large capital demand. They will want to work with vendors who can deliver, and who have market reach, sales abilities, good customers and financial resources. Groups of vendors can also be assembled, by a utility for example, to deliver these features. Assembling groups of vendors can be especially useful in developing countries, where market size may not immediately justify the development of single-vendor financing programs.

The goals of the vendor/financier agreement are to create a creditworthy program, enhance the security structure to allow credit to be extended to more customers, manage transaction costs, and create a volume of business for the financier.
Obviously, the development of vendor financing requires the participation of a motivated vendor. Each of these goals is discussed below.

Strengthening the Credit Structure in Vendor Financing. The financier seeks to enhance the overall structure of a vendor finance program by building security measures into the vendor/financier agreement. The principal techniques for achieving this include:

- *Reserve Funds.* Reserve funds enhance the security of a vendor finance program by creating a pool of money that can be used in the event of customer defaults, late payments or other similar circumstances. Such funds are established from a portion of the finance proceeds of each transaction and are set aside in a reserve fund. Reserve monies are typically added to the total loan amount, ultimately resulting in greater costs to the customer. The vendor does not have to put up reserve monies directly, but must be able to sell the financing to customers with the reserve included. The size of a reserve fund reflects historical and/or estimated default rates, typically ranging from 2 to 5%, depending on the characteristics of the target sector and the portfolio of transactions. Unspent reserve monies typically accrue to the financier, although they can also accrue to the vendor.

- *Holdback.* An alternative means of creating a reserve fund is for the financier to withhold from the vendor a portion of the vendor's equipment sale price. In effect, the financier purchases in stages from the vendor the lease payment stream, or the loan repayments, if a lease is not used. Generally, the financier will purchase a high percentage of the payment stream when the deal is first closed (financially); the balance is paid when, and as, the lease payment record is established or possibly withheld until after the lease term is retired. If the customer defaults, the financier does not have to pay the vendor the balance of the lease purchase price. This provision is applied *to the portfolio of leases as a whole*; holdback monies on good, paying leases are effectively used to recover losses on other non-paying leases. This type of arrangement is called a “cross-default” provision. The vendor, of course, will commonly mitigate this risk by charging a higher price for the equipment. If the customers’ make all of the lease payments, the vendor is paid in full.

- *First-Loss Provisions.* With this provision, the vendor assumes the obligation to repay the aggregate lease payments up to a defined limit of liability. Thus, the vendor assumes the initial amount of any losses resulting from defaults on the transactions. The liability limit is set as a fixed dollar amount, as a percentage of the original principal, or as a percentage of the current outstanding balances under the program. The vendor's first-loss commitment is based on its creditworthiness. As with a reserve fund, the size of the first-loss provision is based on the estimated default rate and must be large relative to the potential loss that might be incurred on any individual default. Obviously, this effect can only be achieved with multiple transactions in a pool. In new programs, default rates must be estimated based on experience in related areas of consumer or commercial finance. Given the uncertainties, vendors could be required to assume higher percentage recourse for the initial transactions, and then reduce that percentage as the number of transactions in the portfolio builds and payment histories are established.

If the financier incurs a loss, the vendor agrees to make payments to the financier up to the defined liability limit. Definitions of “loss” must be unambiguous. If a default occurs, the financier has the responsibility to pursue remedies to recover losses, e.g., to repossess and liquidate leased equipment (if possible) or to recover payments and expenses through legal actions. Because this process is potentially lengthy, the financier will not want to delay receipt of payments from the vendor until all recovery and legal efforts with the lessee have been exhausted.

- *Partial Financing.* Another method to improve the security structure is for the financier to advance less than 100% of the present value of the lease payment stream. Under this mechanism, the scheduled lease payments will be greater than the finance payments due to the financier. This excess, or coverage, assures that the actual lease payments, even allowing for some bad debts or late payments, will be sufficient for the financier to be repaid. If the financier provides 80% - 90% financing, the balance of 10% - 20% could be obtained from another investor, from the vendor directly either as an equity investment or a discount, or from the customer in the form of advance lease payments.

Extending Credit to More Customers. A key element of a vendor finance program is the credit analysis requirements. For larger transactions, credit will likely have to be analyzed and approved individually. If the program generates a sufficiently large volume (several hundred transactions), then a statistical approach to credit analysis may be possible. (See the discussion of this topic in Chapter 3.)

By incorporating some of the security methods described in the previous section into the program structure, the overall financing program becomes more secure. The program has integrity even if a portion of the customers fails to make their payments. Thus, the vendor can be more aggressive in offering financing to more customers, and achieve a greater market penetration.

Where business *volume* is an objective, the purpose of credit evaluation is risk management, not risk avoidance. Taking risks allows for both earning higher yields and booking a larger volume of business. The risks must be assumed prudently and provided for in the finance structure. Thus, energy efficiency financing programs that target high levels of market penetration with common, easily replicable end-use applications can deploy these commercial finance techniques. When energy efficiency projects are implemented on a positive cash flow basis, where the paybacks are strong, customer sensitivity to first-cost price is lessened, creating the ability to incorporate reserves against defaults. This then becomes a powerful marketing tool.

Managing Transaction Costs. Another main goal of a vendor finance program is to manage transaction costs. This can be accomplished by defining standard financing terms, conditions and documents that the vendor will use to originate customer financings. Administrative costs are also reduced by having the vendor or financial institution assume some of the administrative responsibilities associated with originating financing. Also, by spreading the program set-up costs over a series of transactions, costs for individual transactions are reduced.

Aggregation and Pricing. By creating an exclusive relationship between the vendor and the financier, a deal pipeline is created for the lender. The financier charges a fee to the vendor to

set up the program. The fee generally consists of two components: a minimum base fee that is charged regardless of the business volume the vendor generates for the program, and a fluctuating component that is often reduced as certain pre-established business volume targets are met. These volume targets are designed to cover the financier's variable costs of providing funds, which are directly related to the amount of financing extended under the program.

The financier's pricing is primarily a function of the credit risk profile of the overall portfolio. Using credit strengthening techniques can reduce interest costs. Pricing is also determined by the financing term, the number of transactions, the average size of individual transactions, and the total capital demand anticipated.

5.2 The Vendor/Customer Agreement

A key objective of the agreement between the vendor and the customer is to achieve an attractive financial arrangement for the customer. This is usually accomplished by achieving a positive cash flow for the customer, i.e., the savings resulting from the project will be greater than the finance payments and incremental project operating costs. A primary technique used to achieve a positive cash flow is to lengthen the finance terms: financing terms of three to seven years are most common, although terms of up to ten years are needed in some cases. In some emerging market countries, financing beyond a three-year term is unavailable for any purpose.

Under the finance agreement the customer's obligation to make payments is generally unconditional; in other words, payments are made regardless of actual project performance or savings. The customer financing could be a finance lease, installment purchase contract, credit agreement, loan or even an “energy service charge.” These documents can accomplish the same basic terms with the name changing for marketing purposes: a finance lease is most common and will be discussed further here. A separate contract between the vendor and the customer covers equipment installation, operations, maintenance, warranties, performance guarantees and other issues.

An interesting example of vendor financing is the case of Asian Electronics Ltd. (AEL) in India (see Exhibit 5-1). AEL, a manufacturer of capacitors for power factor correction devices, leased its capacitors to an electric utility for use in textile mills. AEL’s agreement as the vendor financier was unusual in that repayments were based on the performance of the equipment.

EXHIBIT 5-1
INDIA: ASIAN ELECTRONICS, LTD.
(1993 - PRESENT)

Background: Bhivandi is an industrial suburb of Bombay, dominated by textile companies that operate approximately 300,000 power looms, each with a 0.88 to 2 hp motor. These power looms operate at a low power factor and low voltage, resulting in high distribution losses. Distribution losses in Bhivandi are about 25%.

The Maharashtra State Electricity Board (MSEB) has experienced a 7 to 10% annual growth rate in energy requirements and peak demand over the past 20 years, and financial constraints limit the amount of additional generating capacity that can be added each year. Maharashtra has transmission and distribution losses of 15.3% (1992-93). MSEB's revenue of Rs.30 million per month came at the expense of a poor voltage profile (i.e., a power factor of 0.6 to 0.7), resulting in the over-loading, over-heating, and break-down of transformers.

Key Stakeholders:
- Maharashtra State Electricity Board (utility)
- Asian Electronics, Ltd. (private equipment manufacturer)
- 300,000 power loom operators in Bhivandi (energy end-users)

Project Description: The use of capacitors improves the power factor and voltage profile. The maximum benefit from a capacitor is achieved if it is fixed at the load end. However, end-users are reluctant to provide capacitors on their looms because they realize no direct benefits. The tariff structure for these power looms was as follows: a fixed charge of Rs.10 per hp and energy charges of Rs.1.10 per unit for up to 20 hp of connected load, Rs.1.40 per unit from 20 to 67 hp of connected load, and Rs.2.50 per unit for more than 67.5 hp of connected load.

MSEB leased 300,000 0.45 KVAR LT capacitors from Asian Electronics Ltd. (AEL), requiring less initial investment on the part of the cash-strapped state electricity board than would purchasing the capacitors. AEL manufactured the capacitors and leased them to MSEB. As lessor, AEL retains ownership of the capacitors and receives the benefit of their accelerated depreciation (100% in the first year after installation). AEL installed the capacitors at the power looms of the end-users and is responsible for maintenance. AEL provided a performance guarantee that stipulated no rental charge for faulty capacitors not replaced within seven days of being detected. The regular rental charge paid by MSEB to AEL is Rs.5/month for the first three years and Rs.2/month for the following two years. Payments will be made quarterly by MSEB to AEL. The power factor will be monitored through measurement at distribution transformers. MSEB has mandated that consumers must maintain a 0.9 power factor; otherwise, they will be charged a penalty. Installation of the AEL capacitors improves the power factor above the mandated 0.9, allowing the end-user to avoid paying the penalty. If a customer elected to install its own capacitor and it was found to be faulty and not replaced, MSEB would impose a penalty of 10% of the monthly energy charge. MSEB will collect rent from consumers as part of their monthly electric bill. Consumers will be charged Rs.5 per month for all five years, allowing MSEB to earn a profit of Rs.3 per capacitor for each of the final 24 months of the program.

Project Results: The goal of installing the low-tension capacitors was to increase the power factor from less than 0.7 to greater than 0.9. Such a power factor improvement would result in total annual loss savings of approximately 100 kWh per year. This is equivalent to 20 MW of installed capacity.

In addition, the leasing scheme resulted in an update of MSEB customer records. The supplier was required to keep careful records of every capacitor installation in order to

receive its rental payments. This information was used by MSEB to update its customer records for unregistered power looms and hp.

MSEB's monthly revenue has increased from Rs.30 million to Rs.85 million as a result of the program. This is due to: normal load growth, reduced interruptions as the breakage of conductors and failure of transformers are minimized, increased voltage which has led to increased output and consumption, replacement of stopped meters discovered in the field, frequent visits to end-user sites that help control meter tampering, and energy audits for each distribution transformer that helped detect and reduce energy theft. In addition, MSEB benefits from the payment structure: MSEB recovers the lease payments from the consumers monthly, but is required only to make payment to AEL on a quarterly basis. This allows MSEB to earn interest on the rent as it passes through MSEB.

By paying AEL Rs.5/month to supply, install, and maintain capacitors, MSEB was able to increase revenue from Rs.30/loom/month to Rs.43/loom/month for a 1 hp supply of power. Energy end-users are paying the increased electricity charges, but are experiencing better production from fewer interruptions of power supply and a better voltage profile. This results in better working motors and a consequent increase in the quality of the woven textiles, which may yield greater revenue for the end-users.

Impact of Vendor Leasing for MSEB		
	Prior to Capacitor Installation	After Capacitor Installation
Distribution losses	approximately 25%	3 to 4%
MSEB's monthly revenue	Rs. 30 million	Rs. 85 million
Power factor	0.6 to 0.7	greater than 0.9
MSEB's revenue per loom (per 1 hp supply of power)	Rs. 30/loom/month	Rs. 43/loom/month

Conclusions: MSEB created the market for the LT switched capacitors by mandating penalties for end-users with low power factors. AEL, with net sales revenue of Rs.7.9 million in the fiscal year ended March 31, 1995, financed its manufacture, installation, and maintenance of the capacitors through its normal balance sheet financing. Leasing the capacitors allowed MSEB to avoid significant initial investment in capacitors upon the commencement of its reactive power management program. End-users are also able to avoid a lump-sum payment, as MSEB passes the monthly rental charges through to the end-users. The program has proven profitable for AEL, increased the power factor which resulted in loss savings and increased revenue for MSEB, and provided better quality electric service with fewer interruptions to end-users.

Source: Asian Electronics, Ltd., Bombay, India.

The vendor can also be the lessor (the source of the financing), but the lease would be a separate agreement that is easily assignable. This type of arrangement strengthens the vendor's marketing position vis-a-vis the customer since it is then the provider of a complete package of turnkey installation and financing. Under this scenario, once the project is completed, a financier purchases the lease payment stream, and the vendor assigns the lease payments to the financier. The vendor acts as the marketing agent of the financing at the point of sale. The vendor assumes many responsibilities associated with the financing transaction, including educating the customer on the financing program, managing the documentation process and customer relationship, obtaining customer execution of lease documents, and collecting credit information.

The lease typically provides 100% financing. The customer might be required to make some type of down payment, ranging anywhere from one or two lease payments to 10% - 20% of the total project cost.

In general, the vendor will provide its own installation financing. The installation period is typically short (just a few days or weeks) for these types of applications. The lease is executed before construction starts, but takedown (i.e., disbursement of lease funds) generally occurs at project commissioning, when installation is complete and accepted by the customer (evidenced by an equipment acceptance certificate).

Vendor finance programs are most often developed in cases where the individual project size is smaller and a statistical or portfolio approach to credit analysis can be taken. These programs have application in energy efficiency financing, especially in the residential and small commercial/industrial sectors. With small transactions, a credit scoring system will typically be developed that allows a credit decision to be made quickly with standard information, such as utility payment history.

A good example of the use of vendor financing for energy efficiency is in Mexico in connection with a pilot industrial motors project implemented by the Fideicomiso de Apoyo al Programa de Ahorro de Energia del Sector Electrico (FIDE), a portion of the financing for the purchase and installation of the motors will come from General Electric, the motors' manufacturer (see Exhibit 5-2).

EXHIBIT 5-2
MEXICO: INDUSTRIAL MOTORS PILOT PROJECT
(1993 - Present)

Program Objective: This project seeks to demonstrate the technical and economic feasibility of optimizing industrial motor and drive systems. The project considers all types of energy efficiency measures related to these systems, including maintenance and the purchase and installation of motor control systems, high-efficiency motors, high-efficiency transmission systems, and adjustable-speed drives. As part of the pilot project, vendor financing packages are being developed for the end-user as an incentive to implement energy efficiency measures with longer payback periods.

Key Stakeholders:

- Equipment vendors
- Medium-sized industries in central Mexico
- FIDE

- CFE
- USAID

Financing Mechanism: Two forms of financing are being utilized in this pilot project: vendor financing for industrial motors and adjustable-speed drives, and a revolving fund to offer attractive packages for longer-term efficiency measures.

Program Description: The Industrial Motors Pilot Project is an innovative initiative between USAID's Energy Efficiency Project and Fideicomiso de Apoyo al PAESE (FIDE). The core of the program consists of motor system audits conducted in 20 medium-sized plants (with monthly maximum demand ranging from 750 kW to 2,000 kW) in the central region of Mexico. The audits are performed by local consultants, paid for by the pilot project budget, and are performed at no cost to the industries. However, prior to the audit, the end-user signs a contract with FIDE agreeing to implement all measures with a payback of less than 6 months or reimburse the cost of the audit.

The project involves equipment manufacturers and vendors in its promotional and technical activities. Participating industries either applied directly for the audits or were recommended by industrial associations or groups. The selected plants represent a cross-section of industries; the majority of the participants come from the food, chemicals, textile, and mechanical assembly industries. As part of the project, financing packages are being developed as incentives for the industrial plants to implement the longer-payback measures. The pilot will test various delivery mechanisms for measure implementation, including self-installation by the industry, local contractors, energy service companies or vendors.

Letters of intent regarding vendor financing of motors have been signed with GE Motors, which indicated it could make available $1 million at attractive/competitive market rates for a three-year term. Other trade allies, including motor manufacturers Baldor and Reliance, and adjustable-speed drive manufacturer Rubicom, are offering various types of concessional pricing and/or financing as part of the pilot. In addition, FIDE is negotiating with co-financiers so as to offer attractive financing packages for longer-term efficiency measures via a revolving fund.

Lessons Learned:
- Although this project has been slowed by the general financial difficulties in Mexico, it does represent a creative use of development support to harness vendor lending programs.
- Organizing the market makes traditional vendor financing part of an overall efficiency program.

5.3 Use of Trade Finance In Vendor Finance Programs

Wherever the discussion of financing includes international markets, the subject of trade finance must be introduced. Many countries do not manufacture important energy efficiency equipment (e.g., heat exchangers, high-efficiency boilers, heat distribution controls, steam optimization technologies, air conditioner and chiller equipment, low-energy lamps and reflectors, advanced motors and drives) and must import all or some of the equipment to meet their needs. Trade in services (design engineering, management or technical services) may also be desired.

Imported equipment and services are traditionally financed using trade finance mechanisms or through a competitive bidding process tied to a multilateral development bank loan. These individual procurements of goods and services require vendors to have access to trade financing mechanisms such as letters of credit confirmed through the commercial banking sector, medium- and long-term buyer's credits, trade insurance policies and relationships with financial intermediaries that work alongside commercial banks and export credit agencies.

Developed countries' export credit agencies can play a role in energy efficiency financing, especially in connection with vendor programs. Programs exist to provide vendor and equipment finance for projects in a range of sizes. For example, the Export-Import Bank of the United States offers credit insurance for terms of between 180 days and 7 years, and medium- and long-term loans and guarantees for terms of up to 10 years. The bank's credit guarantee facilities program is a medium-term line of credit extended by a bank in the United States to a foreign bank. The line of credit is guaranteed by Ex-Im Bank. This may be a suitable vehicle for vendor financing programs. The bank already offers some special programs for environmental goods and services, and energy efficiency falls into this group. Under these programs the maximum repayment terms allowed under OECD consensus guidelines can be extended.

Typical trade credits range from short-term (30 days to one year) to medium-term (about three years). Some long-term trade credits of up to ten years are also available, depending on the life of the equipment and the country risk. Credits of shorter maturities will not be suitable for all types of equipment, especially for certain large-ticket items (waste heat recovery systems) that may have paybacks exceeding three years. However, many low cost/no cost energy improvements that repeatedly show up in energy audits have rapid paybacks that are measured in months, not years. These projects (e.g., installation of steam traps, acquisition of energy auditing and measuring devices, combustion control systems) lend themselves well to being financed through traditional short-term trade finance systems.

For large, capital-intensive items it may make sense for vendors to work directly with the export finance divisions of commercial banks or directly with export credit agencies. For multiple sales of lower-priced items, however, companies need to work through intermediaries.

In addition to commercial banks with trade divisions, vendors can turn to equipment distributors and agents and energy service companies to take on intermediary roles. While intermediaries can be located in the importer's or exporter's country, local intermediaries have the advantage of being much closer to their markets.

5.4 Strategies for Vendor Financing

Vendor-supported financing programs are an under-utilized financing mechanism for energy efficiency. In some countries, vendors are the most motivated stakeholders and are thus in the best position to secure financing. In addition, some of the energy efficiency equipment vendors are large multinational corporations with access to attractive rates and innovative financial products. Export credit financing programs are logical sources of financing because their programs are well-established and operating smoothly.

Some suggestions for vendors, distributors and financial institutions are as follows:

- ▸Equipment vendors can conduct market assessments to identify countries where vendor finance programs may be justified based upon market demand.

- ▸Vendors can team up with commercial banks to develop specific financing programs for the vendors' customers.

- ▸Local equipment distributors, either through their equipment suppliers or commercial banks, can explore ways in which they can provide their customers with credit: short- or medium-term loans, credit enhancement guarantees, or equipment leases. This type of credit could be structured in ways similar to the commercial credit business of the Ford Motor Credit Company (for cars, trucks, tractors, and unrelated lines of equipment) or the Singer Company, which provides loans throughout the world for the purchase of its sewing machines.

- ▸Vendor financing may require that groups of equipment distributors join together to obtain economies of scale or in providing a large enough amount of business to interest a commercial bank already active in trade finance.

Chapter 6 Utility Finance Programs

Utilities can play a very powerful role in financing energy efficiency projects. In many countries, utilities have implemented or are considering implementing demand-side management (DSM) programs (demand-side management programs are utility activities that encourage customers to modify their electricity or gas consumption with respect to both the timing and level of electricity or gas demand). Financing may be a feature of DSM programs. Utilities in the United States and Canada have had DSM programs in place since the late 1970s. Exhibit 6-1 shows the types of activities included in typical DSM programs.

EXHIBIT 6-1
TYPICAL DSM PROGRAMS

Sector	Program
Industrial	Time-of-use tariffs
	Interruptible and curtailable tariffs
	Motor efficiency
	Adjustable-speed drive efficiency
Commercial	Ventilation and air conditioning efficiency programs
	Lighting efficiency
Residential	Refrigerator efficiency
	Lighting efficiency

6.1 Utility Incentives to Promote Energy Efficiency

As a precondition to undertaking an energy efficiency/DSM financing program, the utility must have an incentive to save energy. This incentive may be provided or enhanced by regulation, but must have a sound economic basis.12 Although there may be societal gains as a result of end-use efficiency efforts, financial incentives provide the clearest and strongest motivation for a utility's management to continually pursue energy efficiency as a resource.

Many utilities' efficiency efforts are undertaken primarily on the supply side (the reduction of transmission and distribution losses, for example). Such efforts translate into additional revenue

12 In the United States, many DSM programs have been encouraged through regulatory incentives. These incentives include the allowance of the full recovery of all costs associated with DSM programs, ratebasing DSM costs as they are incurred, allowing utilities to earn a bonus rate of return, and providing utilities with a share of the savings from DSM. In the United States, DSM is considered to be a regulatory-driven approach to energy efficiency.

for the utility. Financial incentives for energy efficiency are frequently less transparent or are negative. Although end-users benefit from energy efficiency projects through reduced energy bills or lower energy costs, the utility frequently realizes lower unit sales and revenues from that customer, thus providing a financial disincentive to promote end-use efficiency. Thus, the utility must realize benefits from end-use energy efficiency elsewhere in its system or be compensated for its lost revenue.

Avoided Investments. The extent of a utility's motivation is often a function of its operating environment. Where a utility is in a power surplus situation, in the short term, the factors favoring energy efficiency investments from the utility's perspective are severely diminished. However, for many utilities in developing countries, there is a *shortage* of power capacity; this is the case in India, China, Columbia, Thailand, Brazil and other nations. Exhibit 6-2 provides a list of power-short countries and the extent of their power outages. In addition, many utilities, while not in a capacity shortage, face constraints in transmission and distribution.

A power-short situation means that a utility must expand capacity in certain regions or for certain peak load conditions, or it might mean that transmission and distribution capacity limits have been reached in certain service areas. Here, the utility may be in a position where its average tariffs are below its long-run marginal costs of production. In these circumstances, a utility has an economic motivation to promote energy efficiency to reduce or avoid capital costs for new generation and/or transmission and distribution capacity. Demand-side management through end-use energy efficiency can be an effective means for delaying capital expenditures for several years.

Cross-Subsidized Tariffs. Another condition common in developing countries and emerging market economies is the cross-subsidization of utility tariffs, where certain customer classes (typically residential, agricultural, or municipal customers) pay rates that are below the utility's cost of service. In this case, the utility has a financial incentive to promote and invest in end-use energy efficiency for these classes as a way to reduce losses and to free up power that can be sold elsewhere, sometimes at a higher tariff, thereby increasing revenues. In cases where another entity bears the cost of the electricity rate subsidy, that party becomes the motivated player in promoting DSM measures.

EXHIBIT 6-2 SELECTED COUNTRIES EXPERIENCING POWER-SHORT SITUATIONS		
Country	**Operating Reserve Margin (%)**	**Extent of Power Outages**
Armenia	NA	Severe shortfall / rationing
Brazil	7.0	Unplanned outages mainly in residential areas
Chile	12.0	Unplanned outages, brownouts
Colombia	-2.0	Rationing and rotating brownouts
Czech Republic	25.0	Brownouts and rationing
Georgia	NA	Frequent outages
India	-13.0	Peak shortfall
Indonesia	14.0	Chronic outages
Malaysia	2.0	Infrequent brownouts
New Zealand	21.0	Brownouts
Pakistan	-6.0	Brownouts
Panama	-9.0	Severe shortfalls
Philippines	-4.0	Rotating outages
Romania	14.0	Severe shortfalls
Slovakia	5.0	Some brownouts
Taiwan	-2.0	Infrequent brownouts

Source: Hagler Bailly Consulting, 1996.

For example, in India, agricultural end-users receive subsidized rates for electricity. The State Electricity Board and the State Government share in the cost of the subsidy, and both are motivated to increase efficiency. Exhibit 6-3 illustrates how utilities can improve their cash flows by reducing the amount of energy sold to agricultural users and selling energy to higher-paying industrial users (the agricultural user experiences no loss in output). This is a realistic scenario because many high-tension industrial customers in India are seeking an increased supply of reliable energy. In this example, on a unit basis, the utility loses $0.035 on every kWh sold to the agricultural pumping station.

EXHIBIT 6-3
FINANCIAL ANALYSIS OF AGRICULTURAL PUMPING RETROFIT IN INDIA
WHEN CROSS-SUBSIDIES EXIST

Cash Flows over the Life of the Investment:	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
Utility Investment in Pump Retrofit	(350)	0	0	0	0	0	0	0
Financing Cost for Pump Retrofit (at 18% Interest Rate)	0	(112)	(112)	(112)	(112)	(112)	0	0
Revenues Lost from Agricultural Customers	0	(30)	(30)	(30)	(30)	(30)	(30)	(30)
Revenues Earned from Industrial Customers	0	255	255	255	255	255	255	255
Net Cash Flow to Utility	(350)	113	113	113	113	113	225	225

	Unit Value		Unit Value
BASIC UTILITY DATA:		**ENERGY EFFICIENCY INVESTMENT DATA:**	
Industrial Tariff (cents/kWh)	8.5	Investment Cost of Pump Retrofit ($)	350
Agricultural Tariff (cents/kWh)	1.0	Life of Retrofit (years)	7
Average Utility Cost for Delivered kWh (cents/kWh)	4.5	Energy Savings from Investment (%)	50%
Utility Loss with Agricultural Customers (cents/kWh)	-3.5	Annual Energy Savings per Retrofit (kWh/a)	3,000
TYPICAL AGRICULTURAL PUMPING APPLICATION:		Annual Savings for Agricultural Customer ($/a)	30
Connnected Load (kW)	3.0	**UTILITY ECONOMICS AFTER RETROFIT:**	
Annual Operation Hours (h/a)	2,000	Annual Costs of Finance for Retrofit (over 5 years; 18% Interest Rate; in $/a)	112
Annual Power Consumption (kwh/a)	6,000	Revenues Lost from Agricultural Customers ($/a)	30
UTILITY ECONOMICS PER AGRICULTURAL CUSTOMER PRIOR TO RETROFIT:		Revenues Earned from Sale of Electricity to Industrial Customers ($/a)	255
Annual Utility Revenue ($/a)	60	**Utility's Net Present Value of Investment (18% Interest Rate)**	**$158**
Annual Utility Cost ($/a)	270	**Payback Time to Utility (years)**	**3.1**
Annual Loss to Utility ($/a)	-210	**Utility's Internal Rate of Return**	**31%**

The installation of a $350 pump retrofit would provide the utility with 3,000 kWh/pump/year to sell to the industrial customer instead of the agricultural user. The net impact on cash flow to the utility would be $113/year assuming five-year financing at 18% per year. Assuming the pump retrofit would last seven years, the net present value would be $273 with a simple payback to the utility of 3.1 years and an internal rate of return of 17%. If 100,000 retrofits were implemented, the total net present value would be approximately $27,300,000 on an initial investment of $35 million.

Customer Retention. Many nations are also undergoing power sector restructuring, breaking up generation, transmission and distribution functions among separate companies and allowing open retail access. In this type of competitive environment, the utility's provision of value-added efficiency and financing services can be part of a customer retention strategy.

Value-Added New Service. The provision of energy efficiency/DSM or financial services may also constitute a new utility profit center. The sale of power can be combined with the delivery of end-use equipment and efficiency services. Energy efficiency also becomes a vehicle to meet the growth in demand for energy services.

Emission Reduction Credits. In the future the utility may obtain benefits via pollution reductions or "Joint Implementation" greenhouse gas emissions credits. Chapter 8 discusses this further.

Determination of Value to the Utility. In order for utilities to determine whether or not energy efficiency is an economic option, it is often useful for them to assign value to energy efficiency investments and DSM programs. One way to do this is to conduct economic and integrated resource planning studies. Integrated resource planning is a technique that generates the least-cost utility plan by considering both supply- and demand-side resources on an equal footing. Several quantitative approaches can be used to evaluate the value of DSM options to the customers. The most commonly used of these tests are:

- the participant test, which evaluates an option from the perspective of a customer participating in a DSM program
- the rate impact measure, which evaluates an option from the perspective of customers who do not participate in the program
- the total resource cost test, which is an aggregate perspective that includes both participants and non-participants
- societal tests, which are extensions of the total resource cost test and include environmental externalities and other societal costs.

While the outcomes of these tests may be critical indicators for a utility, the utility must still perform a financial analysis of any DSM program.

Equally important are steps by utility regulators to create mechanisms and incentives for utilities to recover their energy efficiency program costs.

If the financial incentive exists for the utility to promote energy efficiency, then the utility can play a key role in organizing the market. The following section reviews the roles a utility can play in financing energy efficiency.

6.2 Utility Roles in Financing Energy Efficiency

The utility can assume four roles in financing energy efficiency: facilitator, collection agent, financial services provider, or payor/buyer. These roles are outlined in Exhibit 6-4 and discussed below.

EXHIBIT 6-4 UTILITY ROLES IN FINANCING ENERGY EFFICIENCY			
Facilitator	***Collection Agent***	***Financial Service Provider***	***Payor/Buyer***
Organizer of end-user groups	Billing and collection of finance payments	Project implementor	Procurer of efficient products and services
Conductor of procurements		Financial service provider	Purchaser of efficiency resources
Provider of lower transaction costs			

Utility as Facilitator. As a facilitator, the utility is essentially acting to organize the market for key stakeholders: the end-users (their customers), energy efficiency businesses, and financiers. A utility can provide technical assistance to customers on energy end-use matters and in procuring energy efficiency services and equipment. Alternatively, it can solicit financial institutions to finance energy efficiency initiatives. A number of measures that a utility can take to stimulate the development of the market are outlined below.

Informing the Energy End-User. Customers generally need assistance in making decisions on which energy efficiency projects to pursue, how to provide metering and submetering, assembling energy cost and consumption data, conducting energy audits to identify savings measures, and estimating their costs and benefits. Utilities are in a unique position to understand the energy needs and consumption patterns of their customers, and to provide technical assistance in this area.

Conducting Procurements. A utility can help its customers procure energy efficiency equipment and services to implement projects. It can evaluate the qualifications of engineering and energy service companies, develop specifications for equipment, advise customers in negotiating contracts with service providers, and provide follow-up project evaluation. Project evaluation is particularly important when a third party has been contracted to provide certain services, and whose payment is based upon delivered savings.

Stimulating the Interest of Financial Institutions. Utilities can be instrumental in prompting financial institutions to enter the energy efficiency market. They are also an ideal vehicle to perform the project pooling or aggregation functions needed to achieve the “economies of scale” that will draw financiers into the market. Utilities can organize end-users, develop projects, and be a conduit for marketing financing. They can broker relationships between financiers and the end-users and energy efficiency businesses that need their financing. Utilities can enter into exclusive arrangements with financial services providers for energy efficiency

financing programs, and then help market the financing program effectively. By creating deal flow and capital demand, these efforts can attract capital to the market. Pooling is also essential to aggregate capital demand.

Lowering Transaction Costs. By pooling a number of energy efficiency projects, end-users' fixed costs can be shared across the pool, thus lowering the cost to any one project. The utility's ability to organize, share in, and distribute the costs of energy efficiency program set-up and administration is a tremendous asset.

Utility as Collection Agent. One method of aggregating capital demand and addressing credit risk in energy efficiency financing programs is for the utility to collect finance payments through its bills. This technique has been used successfully by several utilities in the United States and other countries, including CFE in Mexico, EDF in Guadeloupe/Martinique, and Maharashtra State Electricity Board in India.. End-user payments are passed through as collected and are typically aggregated for a single monthly payment to the lender. The convenience and regularity of utility bill payment by the customer makes for more dependable collections. The customer's utility bill payment history can also be checked as a quick and easy method of credit verification. If the utility is also able and willing to terminate service in event of customer default on the finance payment, this would add a major incentive to repay and improve collections.

Two cases (presented in Exhibits 6-5 and 6-6) illustrate how a utility can act as a collection agent and thereby facilitate investments in energy efficiency. The first case describes the program EDF initiated in the Caribbean islands of Guadeloupe and Martinique. Although a unique French law undeniably played a role in EDF's initiatives, EDF still successfully catalyzed market penetration of CFLs in the two islands. The second case, Ilumex, as the program is called, is well-known. CFE, a Mexican utility, provided partial financing for an efficient lighting program. CFE acted as the collection agent and also ensured that the program would become self-sustaining through the use of a revolving fund. The case is also illustrative of how creative partnerships among various stakeholders can bridge the gap between micro and macro players.

EXHIBIT 6-5
GUADELOUPE AND MARTINIQUE: RESIDENTIAL COMPACT FLUORESCENT LIGHTING LEASE PROGRAM
(1992 - 1994)

Program Objective: Electricite de France (EDF), the French national electric utility, maintains responsibility for power service in the Caribbean islands of Guadeloupe and Martinique, French administrative territories. EDF incurs power system costs (1.26 FF/kWh on Guadeloupe and 1.15 FF/kWh on Martinique) that are almost twice the allowed tariff (0.71 FF/kWh and 0.61 FF/kWh for 3 and 6 kva service, respectively). Since French law requires that EDF must supply electricity to all of France and her territories at the same rate, EDF annually loses on the order of $100 million providing power on Guadeloupe and $60 million on Martinique. Reducing these losses was EDF's primary motivation for this project.

Key Stakeholders:
- Electricite de France
- ADEME

Financing Mechanism: CFL units were distributed to residential customers at no initial cost. A surcharge per bulb was added to each customer's electric bill with the amount of the surcharge designed to be less than the monthly energy cost savings, generating a positive cash flow for the customer. Break-even was based on a minimum 1,200 hours/year lamp usage. The CFLs were leased at cost with payments made quarterly over 18 months.

Program Description: EDF, in conjunction with ADEME, the French agency for energy management and environment, launched a marketing and lease financing program that has proven highly successful in penetrating the residential lighting market with CFLs. Over 700,000 15-watt CFLs were leased to EDF residential customers, resulting in 14 MW of load reduction and almost 63,000 MWh of annual energy savings. Distribution was accomplished via a coupon system. Each customer received coupons by mail for up to ten CFLs and redeemed the coupons with participating retail stores. (The maximum number of lamps per household was reduced to six for the Martinique program.)

EDF placed an initial order of 100,000 units. Through bulk purchasing, EDF was able to procure the CFLs at a price of 89 FF/unit ($15.60 US, EDF's price), about one-third the then-prevailing retail price on Guadeloupe. By 1994 the retail price had fallen to between 111-150 FF/lamp ($17.66-$24.00). Several additional vendors entered the market, including Philips, which received the first bulk orders for the Martinique program. The first bulk purchase for Martinique resulted in a lamp price of

$12.10 per unit. Thus, this program has effectively transformed the CFL market on these islands.

Lessons Learned:
This program's success was due primarily to the intensive advertising campaign. The short lease term of 18 months would have to be extended in areas with lower electricity prices in order to generate positive cash flow for the customers.

SOURCE: This case study summarizes information provided in *Electricite de France: Operation LBC: Profile #119,* The Results Center, Basalt, CO, 1995.

EXHIBIT 6-6
ILUMEX (1992 - Present)

Program Objective: Proyecto de Uso Racional de Iluminación en Mexico, or Ilumex, is designed to demonstrate the impact of utility investments in lighting efficiency, primarily in the reduced cost of providing energy services. Additionally, such investments alleviate part of the need to construct new, capital-intensive, and polluting oil-fired electric generating plants.

Financing Mechanism: A revolving fund was established from several sources, including a GEF loan ($10 million), a World Bank loan ($10 million), and financing from Norway ($3 million, offered in return for joint implementation of offset credits). USAID provided a $200,000 grant to fund the initial project development phase. The initial funds made available to the program from CFE totaled $23 million.

Program Description: Under the Ilumex project the Mexican national utility, CFE, provides compact fluorescent lamps (CFLs) at reduced prices to residential electric customers in two cities, Guadalajara and Monterrey. The lamps are sold at CFE district offices; customers may either pay cash or pay over time through their electric bills. It was originally planned to sell all of the lamps within two years. Sales began, however, in the second quarter of 1995. Sales are currently running 200% above forecast levels. It is planned for Ilumex to expand sales to other non-residential and non-lighting DST areas. By establishing a revolving fund, Ilumex will be able to gradually expand to the rest of Mexico without requiring additional funds. The original $23 million investment will be replenished by revenues from the sales of CFLs; thus, Ilumex will become self-sustaining.

As a result of selling 1,700,000 CFLs during the initial phase, Mexico will be able to avoid generating 169 GWh/year and reap capacity savings of 100 MW. Also, the energy-saving benefits of the CFLs will cushion the impact of planned price increases as electricity subsidies are removed. CFE purchased 1.7 million CFLs under Ilumex, the largest procurement in the history of the lighting industry. The procurement will drive the global lighting market by establishing a CFL technology for developing country conditions. The new CFLs designed for Ilumex will be of particular interest to other industrializing countries that face poor power quality, high power sector debt, power shortages, and high pollution levels.

Lessons Learned:

- Market penetration of a new technology is eased by minimizing the barriers faced by end-users. In this case, CFE uses existing facilities for distribution and its billing system for payment, thereby facilitating customer purchases.

- Donor funds (USAID) are leveraged to attract other sources of funding to implement the project. These funds were also instrumental in financing the initial project development phase.
- The large procurement of a new design acts as a catalyst to market creation by effectively lowering the cost of the lamps. Although the cost to the consumer is somewhat expensive (around $13), the bulk purchase has allowed a custom design for developing country conditions.

Positioning the utility as the collection agent enables the aggregation of capital demand in a single program and enhances the credit structure of a financing program; these features can help attract commercial finance participants. Utility participation in such a program can also add credibility and enhance program marketing.

Another successful example of this method's use is the PacifiCorp commercial/industrial Energy FinAnswer leasing program. PacifiCorp, a U.S. investor-owned electric generating and distribution utility serving customers in Utah and six northwest states, has offered a commercial/industrial sector financing program since 1992. The utility provides capital for approved energy efficiency projects and end-users make payments as an "energy service charge" on their utility bill. With financing for economical projects, customers can achieve immediate positive cash flow for the investment. PacifiCorp provides technical assistance to end-users on project engineering, development and contracting. These services are designed to reduce and manage the risks associated with achieving savings.13

PacifiCorp was motivated in this program to reduce ratepayer-financed rebates and shift more of the DSM program costs to the participating end-user while still maintaining an attractive customer offer. PacifiCorp recovers its invested capital, with interest, but continues to incur program administrative, marketing and technical assistance costs. A trade ally network is developing, creating momentum for the marketing program. PacifiCorp recently sold a portfolio of approximately $25-30 million of these loans to Citicorp. PacifiCorp appears satisfied with the program, has gained valuable marketing and procedural experience, and is planning to expand the program.

Utility as Financial Services Provider. Because of their customer relationship, market position, access to capital, and in-place systems to collect payments via utility bills, utilities have natural advantages as financial services providers. When providing financing services, the utility earns fees and/or recovers its investment with interest. The utility is a vehicle to access financing for its customers, but the customer must repay the financing. This role is different than the one the utility takes when it pays financial incentives or undertakes other forms of purchasing efficiency and demand management.

The provision of financial services can take several forms, including direct loans or leases to customers. Or the utility may choose to work through other equipment vendors, offering finance programs marketed by selected, qualified equipment sellers. In some cases, the utility may undertake this effort as a separate business or profit center, for example, by establishing a captive or in-house financing company.

Financing programs must be designed for the characteristics of the target end-user sector. Some programs may be focused on particular technologies, such as compact fluorescent lighting, motors or capacitors. Section 6.3 discusses financing program design considerations.

13 The Results Center, 1993. *PacifiCorp Large Commercial Energy FinAnswer*. Profile #46. Basalt, Colorado.

EXHIBIT 6-7
POLAND: EFFICIENT LIGHTING PROJECT
(1995 - Present)

Program Objective: This pilot project is designed to reduce greenhouse gas emissions in the electricity sector by building demand in the Polish market for CFLs and other lighting products. The goal is to rapidly replace 1,150,000 incandescent bulbs with CFLs over two lighting seasons.

Key Stakeholders:
- International Finance Corporation (IFC)
- Global Environment Facility (GEF)
- Netherlands Energy Company B.V.
- Polish Power Grid Company (PSE)
- Gliwice (GZE) and Warsaw Power Distribution Companies (WZE)
- Polish manufacturers of CFLs

Financing Mechanism: A $5 million GEF grant channeled through the IFC will enable a manufacturer's wholesale cost reduction designed to increase residential consumer purchases of CFLs. The full incentive must be passed on to the retailers, and further "pass-throughs" will be maximized. By targeting domestic manufacturers of CFLs, import duties of 15% are avoided.

Program Description: The IFC/GEF Poland Efficient Lighting Project is a utility DSM program funded by a $5 million grant from the GEF to provide financial incentives through Polish manufacturers of lighting products to residential and commercial end-users. The program is administered by the Netherlands Energy Company B.V. for the IFC. One important aspect of the project is to build the capacity of selected Polish electric distribution companies to implement DSM programs.

The level of price discount was preliminarily determined to be $3.05/unit for integral CFLs. The program utilizes several distribution channels, including established manufacturers' distribution systems, retail sales shops, bill payment locations for GZE and WZE, and emerging CFL manufacturers' networks.

Lessons Learned: The direct manufacturer subsidy is a critical tool for lowering the retail price of CFLs to a level that will induce consumer purchases

Utility as Payor/Buyer. Once a utility has established a value for efficiency and demand management, it can reflect this value by purchasing efficiency and DSM resources at a specified price. As the "payor," the utility is willing to contribute directly to the costs of an energy efficiency project. This is the key point of differentiation from the first two roles that a utility can play. In providing financing services, the utility is a vehicle to access financing for its customers, but the

customer must repay the financing. However, when the utility values energy efficiency resources sufficiently, it may be willing to pay directly for some or all of the costs associated with an energy efficiency project, in addition to providing project development and technical support to its customers.

Two main forms of direct payment and credit support are common:

- rebates or direct payments to customers or equipment manufacturers (lowering the cost of equipment to the end-user)
- purchasing delivered energy or capacity savings.

Rebates. Providing rebates in effect "buys down," or lowers, the cost of the energy efficiency equipment for the customer. Rebates can be provided directly to the customer to pay for all or a portion of a project's installed cost. Typically a utility approves an equipment plan and the associated energy savings estimates, and then commits to the rebate program prior to installation. After equipment is commissioned, the rebate is disbursed to the customer (or installer).

As an alternative to making direct payments to customers, the utility can provide financial support to the manufacturer, resulting in a lower retail price. A product buy-down applied at the manufacturer level may result in a greater reduction in the customer's net price than an equivalent buy-down given directly to the customer. This is true because the equipment distribution chain results in mark-ups as a product passes from manufacturer to distributor to retailer. A residential CFL program that is being developed in Poland with support from the World Bank Global Environment Facility (GEF) will utilize this method (see Exhibit 6-7).
***Purchasing Delivered Energy or Capacity Savings*.** A utility can promote energy efficiency by acquiring power resources. When procuring power supplies, it can suggest or require that energy efficiency resources be bid jointly with power projects or allow energy efficiency projects to be processed by themselves and compete directly with new supply. This method requires a contract (often a DSM contract) between the utility and either the customer or an energy services company.

Exhibit 6-8 shows a deal structure where the utility has contracted with an energy services company. The price (or price schedule, often time-differentiated) for delivered kWh or kW savings is established for the contract term, and provision is made for measuring and verifying savings. If the price the utility pays does not cover all of the costs of the energy efficiency project, the customer must share the costs. Unlike a rebate program where the utility makes one lump sum payment based on estimated savings, this payment-for-delivered-savings method allows the utility to pay only for the savings it receives. If the project saves less than estimated, fails altogether, or the customer goes out of business, then payments are reduced or terminated accordingly.

Exhibit 6-8 (not available)

Providing Credit Support. The utility can help to access credit for less creditworthy customers and provide programmatic credit support, on a full or limited recourse basis. Utility credit support can help extend financing to more customer classes and create creditworthy structures sufficient to attract commercial financiers.

There are often mismatches between good efficiency projects and good credit risks. Because the utility can experience the system-wide benefits of energy efficiency projects, it is in a good position to reconcile this mismatch.

Limits on recourse to the utility would be defined and become a contingent liability. The utility's actual costs for providing credit support are proportional to the default rate under the relevant finance program and can be designed to be recovered in the program; the utility incurs an intangible opportunity cost for encumbering its balance sheet.

A utility's role as financial services provider and as payor can be creatively combined to great effect. For example, its willingness to pay for a portion of energy efficiency project costs can aid in designing an effective, creditworthy financial services program. The utility's contribution can be used as a credit enhancement, reserve fund, equity contribution, interest rate, project cost buy-down, or some other form to create a financing program that is attractive to customers, extends credit to more customers, and achieves high levels of market penetration.

6.3 Utility Energy Efficiency Financing Program Design Considerations

Utilities that want to promote energy efficiency must also consider how customers will finance projects. Customers may be capital-constrained, or they may have higher priorities for using their capital. Providing or arranging financing may thus be essential for a utility to achieve its efficiency implementation goals.

The general themes of program design include assuring that the program is attractive and marketable to customers, that services will be delivered effectively, that appropriate roles will be assumed by third-party contractors, and that utility costs are measured against the value of energy efficiency and DSM goals. Key considerations in designing effective utility financing programs are listed here and discussed below:

- mix between customer and utility contribution to investment costs
- decision to offer direct financing or financial incentives
- terms of financing offered
- management of transactions costs
- development of credit procedures
- possibilities for credit enhancement
- provision of ancillary services
- in-house or outsourced delivery of financial services
- use of internal or external capital resources.

***Customer vs. Utility Contribution to Investment Costs*.** One of the main reasons a utility offers financial incentives is to increase customer participation in end-user energy efficiency and thus reach the market penetration expected under its DSM goals. While a utility does not want to offer more financial incentive than necessary to achieve its goals; it does want to offer enough incentive to make the program profitable. The amount and form of the most effective utility financial incentives can vary by sector.

For example, residential and small commercial customers typically need larger incentives, whereas large commercial and industrial customers may have sophisticated management and access to capital on their own. Many types of financial incentives can be designed; they are usually variations of a direct cash grant or “rebate” to the customer which buys down a portion of the project cost.

Direct Financing vs. Financial Incentives. In lieu of or as a supplement to a direct financial incentive, the utility may offer financing for customer investments. This offer may be just as effective as a direct financial incentive in increasing customer participation, particularly if the financed project can generate positive cash flow. Providing financing (which the customer repays with interest) instead of a cash grant costs the utility less and may even become a profit center. Combining a financial incentive with financing, a utility may size the amount of the incentive to buy down the project costs to an amount the customer can then finance on a positive cash flow basis.

For example, efficiency measures with an average simple payback period of 3.8 years that are financed at a 12% interest rate over a five-year term would break even on a cash flow basis for both the utility and the end-user for the first five years. If the utility provided a 25% rebate or a subsidized interest rate, the cash flow to the end-user would increase and the payback would be shorter (see Exhibit 6-9). Financial incentives can be easily blended into the program to stimulate more customer participation and/or to allow longer payback measures to be installed.

EXHIBIT 6-9
BENEFIT TO THE UTILITY OF OFFERING FINANCING

	Utility provides financing	**Utility financing plus 25% rebate**	**Utility financing plus subsidized interest rate**
Energy efficiency investment	$1.25	$1.00	$1.25
Annual cost savings	$0.33	$0.33	$0.33
Loan terms (years)	5	5	5
Interest rate (%)	12%	12%	8%
Annual financing payments	$0.33	$0.27	$0.30
Payback (years)	3.8	3.0	3.8
Five-year cash flow to end-user	$0.00	$0.33	$0.15
Cost to utility	$0.00	$0.25	$0.15

Finance Terms. The finance term should generally be long enough to allow customers to achieve positive cash flow in financing the intended energy efficiency measures.

Research on the paybacks of typical energy efficiency measures is necessary. Also, the interest rate must be seen as competitive. The utility may want to offer a below-market interest rate and may be able to induce a greater increase in customer participation with this technique at lower cost than direct rebates or buy-downs of project costs. Administering small transactions is expensive and often is reflected in higher interest rates for small commercial and residential programs. Instead of charging higher rates, the utility may be able to recover these costs in another form, e.g., in the project cost or as an administrative fee. In other words, the customer offer must be packaged properly to reflect customer perceptions about what is a "good deal."

Transaction Costs Management. To manage transaction costs properly, finance terms must be standardized. For larger transactions, some negotiation or crafting of special finance terms may be prudent to meet customer needs. Documentation procedures should be designed to be easy and "customer-friendly." The simpler the paperwork required to execute a financing, the greater the participation. Customer relations can be handled by a single account representative to improve customer service.

Credit Procedures. The credit approval process for customer participation must also be streamlined. The utility or its capital providers must determine the procedures and criteria to be used to analyze and approve of the customer's credit. Calculations should be made in advance concerning the portion of the target customer base that is anticipated to be eligible for financing given these credit criteria. Customer creditworthiness for large transactions must be evaluated individually. The credit evaluation may be performed by a financial intermediary contracted by the utility. For smaller transactions, a credit scoring system could be developed that allows for quick and manageable processing. Utility bill payment history could be used as a primary source of credit information.

Credit Enhancement. The security structure for the financing program can be designed to allow access to credit for more customers in the target sector. Basic methods such as the "lien-at-the meter" and collections of finance payments via the utility bill can be used. The utility may also want to assume more credit risk directly in the program to increase credit availability. This risk exposure may become a cost, but would be justified as a way to meet DSM program goals. Another method a utility can use to support energy efficiency financing is providing credit enhancement backing repayment of the financing extended to its customers by another lender; this subject is discussed further in Chapter 7.

Financing alone is generally not sufficient to induce customer participation. Additional technical assistance is often needed to develop programs, including customer education, project design, contractor selection, installation and commissioning. Because of its customer relationship, the utility has an important role to pay in marketing. The utility program should anticipate the contracting and financing methods to be used for project implementation, i.e., how the energy efficiency services will be delivered.

Ancillary Services. In some cases, the utility may need to promote the development of the energy services industry to deliver the required services. Financing is best conceived as supporting project development programs and as one element of an energy efficiency service delivery system. The distribution of project roles between the customer, utility, and other contractors may vary among sectors. For example, residential and small commercial customers may be most responsive to a "one-stop-shop" approach.

A utility-designated contractor can be the single point of customer contact, managing the sale and installation as well as the financing process at the point of sale. Larger customers may assume some functions and divide roles between various parties. In this case, a single utility account representative designated to manage the customer relationship and oversee utility contractors on behalf of the customer is recommended.

In some cases, energy services contractors can guarantee energy efficiency equipment performance, and monitor and verify energy cost savings. These additional services can aid in marketing, making the program more attractive to customers. Measuring and verifying savings is also essential for the utility to demonstrate the results of the program.

In-house vs. Outsourced Financial Services Delivery. Program operations require design and set-up, marketing, various administrative functions and capital. Administration includes documentation, credit review, record keeping, closing disbursements, billing and collecting, and other post-closing monitoring. Specialized financial services firms may have advantages in administration. The utility might contract with such a firm, cooperating with information management, and perhaps assuming the billing and collecting functions via the utility bill. Utility compensation for performing administrative services could be built into the project or financing costs.

The utility's inherent advantages in marketing can still be employed if it designates an approved financing source or organizes a utility program to be run by a financial services contractor.

Internal vs. External Capital Resource Use. Although a utility may be able to access low-cost capital, it may have other higher priority demands on or higher yielding opportunities for its capital resources. It may conclude that other financial services firms are better equipped and capitalized to provide financing for these applications. The utility may use external capital, but provide direct recourse or guarantees to the lender in order to obtain the lowest possible capital source. Such guarantees may also allow financing to be extended to more customers. To procure a lender, the utility could develop a request for proposals for financial services.

6.4Strategies for Developing Utility financing Programs

Develop Utility Incentives for Energy Efficiency. Identify utilities that are aware of the financial benefits that they can derive from energy efficiency investments, or alternatively, work closely with utilities to assist them in recognizing where they may already have incentives or how they can introduce new incentives for efficiency. Help utilities in making a determination of the value of energy efficiency and ways in which they can realize this value.

Help utilities to develop financial services programs to meet their energy efficiency or DSM goals, adapting one of the several programs described above. It is important that utilities conduct the economic and integrated resource planning studies needed to demonstrate and assign value to energy efficiency. Equally important are steps utility regulators can take to create mechanisms and incentives for utilities to recover their energy efficiency program costs.

Encourage Traditional Power Sector Lenders to Provide Utility Credits for Energy Efficiency. Such multilateral development banks as the World Bank have extensive lending relationships with utilities. Power sector loans can be a vehicle for these banks to provide financing to utilities to capitalize their energy efficiency financing programs.

Combine Utility Programs for Renewable and Off-Grid Applications with Energy Efficiency Financing. Disbursed generation and renewable energy technologies can be financed employing many of the same techniques used for energy efficiency. Financing mechanisms for small-scale renewable energy, including off-grid applications, can be developed in conjunction with efficiency financing programs. This synergy can help implement an end-use approach to supply planning, for example, by financing off-grid power generation systems together with end-use equipment in the rural hospital, refrigeration, pumping and other applications.

Chapter 7 Special-Purpose Funds

The history of using special-purpose funds as a way to promote energy efficiency projects is a mixed one. There are examples where such funds have been very successful, and they can be a useful tool in conjunction with program and project development. But in general, the creation of special-purpose funds for private sector energy efficiency investments has not been successful in instances where market opportunities are absent (many successful funds were able to offer below market-rate financing). The key is properly structuring these funds before they are implemented and then ensuring that they are utilized. To the extent that special-purpose funds are expected to earn a return, it is also critical that they be used within a certain period of time, usually several years or less.

This chapter describes various types of special-purpose funds, the types of financial institutions likely to participate in them, the funds' applications to energy efficiency, examples of successful and failed applications of these funds, suggestions for using credit enhancement for energy efficiency, and strategies for developing funds.

7.1 Types of Special-Purpose Funds

In the broadest sense, special-purpose funds are monies that are directed and limited to a specific use, country, region, sector, or type of investment. Many different types of funds exist and the term “fund” encompasses various financial structures. Any of the types of funds described here can be used for energy efficiency.

Restricted Accounts. These consist of a fully-funded trust or account restricted to specific purposes and administered by an agency or financial institution, usually under an agreement.

Line of Credit. This is a dedicated line of credit at a commercial or development bank, or government agency, that is made available on a commitment basis, but is returned if not used.

Revolving Loan Fund. This fund is structured to become self-sustaining after the fund's initial capitalization.

Investment Fund. This fund can be closed-end, open-ended, capitalized with equity, or leveraged with equity and debt. Its main purpose is to obtain an acceptable return for its investors/owners, although multiple developmental objectives often may be achieved.

Guaranty Fund. This is an aggregation of commitments to cover the obligations of other parties, usually guaranties of loans. Instead of providing direct funding, a guarantor takes on a contingent liability that is called only in the event of non-performance. Guaranties can take many forms, and function as a very flexible financial structure. For example, they can be made for a portion of a loan, guaranty a return on equity, or guaranty against specific types of risks (e.g., political, technical and operating performance, price).

A guaranty fund can be issued by a creditworthy institution to provide access to funds not ordinarily available.14 Guaranties are also used to leverage resources. Because a guaranty is a contingent liability and not an outlay of cash, the cost of its issuance can be limited.15 Some guaranty funds are leveraged so that they provide, for example, $100 worth of guaranties to $10 worth of capital. Most popular are loan guaranties where the repayment of interest and principal are guaranteed.

Component of a Broader-Purpose Fund. Energy efficiency funds have been coupled with funds for environmental improvements, industrial productivity, municipal housing, renewable energy, or an all-energy fund.

Tax-, Contractual, or Legal-driven Fund. A fund can be structured as the most practical way to channel funds to a particular recipient, for legal, contractual or tax reasons.

Blocked Funds. These are sometimes set aside as a way to limit losses and recover monies spent. For example, where investors or governments find themselves in possession of funds in inconvertible currencies, they may establish a fund to re-invest the local currency in projects that will eventually allow the funds to be recovered.

Depending on the structure of the fund, recipients receive grants, loans (interest-free, subsidized, or at market rates), equity, debt (term, convertible, subordinated), guaranties, or any combination of the above. Governments often capitalize these funds with tax receipts, surcharges or user charges (pollution charges), or penalties. Non-profit organizations may capitalize funds with voluntary contributions or membership fees.

7.2 Motivated Stakeholders in Special-Purpose Funds

Organizations find it useful to develop special-purpose funds for a variety of reasons. Government agencies develop these funds to further such policy objectives as environmental improvement, productivity gains, energy conservation, and energy security. Multilateral development banks often commit to special-purpose funds as a way to retail their funds and reach multiple smaller borrowers, as well as to further development objectives, such as capital market development.

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14 The loan guaranty fund of the Overseas Private Investment Corporation (OPIC), a U.S.Government agency, is a good example of accessing a source of funds not ordinarily available through a guaranty program. Because the OPIC guaranty is backed by the “full faith and credit” of the U.S. Government, its issuance allows any commercial bank or institutional investor to purchase OPIC-guaranteed medium- and long-term notes at rates that reflect the risk of a U.S. Government agency defaulting. The funds' recipient receives a medium- or long-term loan at USG agency rates and pays OPIC a guaranty fee that reflects OPIC's risk. Although OPIC has not provided the funds directly to the recipient, its issuance of a guaranty has allowed the fund recipient to access funding sources that would ordinarily not be available given the risk of the transaction. OPIC has used its loan guaranty to access capital for investment funds.

The cost of a guaranty can be limited to the amount of reserves set aside to support thecontingent liability (from zero to 100%) or the cost of estimated future payments made under the guaranty. The cost of a guaranty can be determined based upon the price of the risks assumed. The USEXIM bank, for example, charges guaranty fees that reflect the market-determined cost of the country and commercial risks.

Individual and institutional investors find these funds to be a useful mechanism for diversifying their portfolios and for meeting their investment objectives. Equipment manufacturers, utilities, and energy service companies may find such funds to be a useful component of their marketing programs.

The stakeholders most likely to participate in special-purpose energy efficiency funds and the types of funds they might create are shown in Exhibit 7-1. As this table indicates, nearly any stakeholder can be involved in either the development, financing or administration of a special-purpose energy efficiency fund. Examples of existing or past energy efficiency funds include most, but not all, of these participants.

Multilateral development banks, foreign assistance agencies such as USAID, and local government agencies have had the most experience with energy efficiency funds. These organizations are likely candidates to participate in future funds; however, some of them have had poor experience with energy efficiency funds and may be reluctant to pursue them further. Investment finance agencies, export credit agencies, local utilities and the private sector (both foreign and local) have had a limited (if any) history in the support of special-purpose energy efficiency funds. These groups are good targets for participating in new funds.

7.3 Application to Energy Efficiency

There are several reasons why funds are useful to energy efficiency projects, but not all of them apply in every instance.

To Offer Specialized Skills. Energy efficiency lending requires specialized skills and expertise that are not ordinarily possessed by many financial institutions. Special-purpose funds can provide a central point of knowledge for technical and engineering expertise in the evaluation of energy efficiency investments and/or the structuring of energy efficiency contracts, such as performance contracting or leasing. This rationale is most meaningful when the demand for capital is known and it is likely that the fund will be used.

EXHIBIT 7-1 LIKELY PARTICIPANTS AND TYPES OF FUNDS FOR ENERGY EFFICIENCY		
Participant	**Examples**	**Fund Types**
Foreign Organizations		
Multilateral Development Banks	World Bank, EBRD, ADB, InterAmericn Development Bank, African Development Bank	Restricted accounts, line of credit, revolving fund, guaranty fund, small and medium-size enterprise funds
Foreign Assistance Agencies	USAID, ODA, CIDA, Japan ODA	Guaranty fund, credit enhancement, seed capital for investment fund, grants, and subsidized loan funds
Investment Finance Agencies	IFC, IIC, OPIC, CDC, KFW	Investment fund, guaranty fund, insurance fund, all-energy regional funds
Export Credit Agencies	USEXIM, JEXIM, EDC, HERMES, COFACE, SACE, ECGD	Lines of credits
Private Sector	Foundations, institutional investors, individuals	Investment funds, grant funds, revolving funds
Local Organizations		
Governments	Environment and energy agencies, municipalities, development banks	Subsidized loan funds, grant fund, revolving loan funds, credit lines, restricted accounts
Utilities	Electric utilities, district heating, water utilities	Not yet developed to any degree
Private Sector	Equipment vendors, commercial banks,	Leasing fund, lines of credit, revolving funds, investment funds.

EXHIBIT 7-1 LIKELY PARTICIPANTS AND TYPES OF FUNDS FOR ENERGY EFFICIENCY		
Participant	**Examples**	**Fund Types**
	industry associations, foundations	

To Provide Extra Market Development and Project Preparation Assistance. An energy efficiency fund can assist in organizing the market for efficiency investments. It can address the "chicken or egg" problem of which comes first, the market or the financing. By providing additional services such as project preparation or project development along with financing, energy end-users may be more likely to make investments. To the extent that additional services are provided, it is probably necessary to have some funding for technical assistance. This type of fund should be organized in close cooperation with other programs, such as a demand-side management program. Dedicated funds also strengthen the identity of energy efficiency markets by communicating to the market that financing is available in this priority area.

As a Vehicle to Finance Smaller Projects. Energy efficiency is no different from other types of lending to small and medium-sized enterprises where the use of specialized funds is an acceptable vehicle for retailing funds. Borrowers will be able to benefit from working with a local financial institution, the shorter time to approve transactions, and the ability to communicate in their own language. By creating a special-purpose fund, such financial institutions as multilateral development banks have a vehicle for channeling funds to small projects.

As a Way to Lower Transaction Costs. By replicating types of transactions to the same type of borrower or by using standard financial structures, transaction costs can be lowered.

Suggested Applications. There are four primary applications for special-purpose energy efficiency funds:

Across End-Uses. These funds may be applicable across specific end-uses where many similar energy use characteristics allow for standardized project evaluation. End-users may have similar energy use patterns and characteristics, or stable loads to which common proven technical solutions and equipment can be applied. Power factor correction devices is one example (see the India: Asian Electronics case in Exhibit 5-1). Special-purpose funds can also be used where energy measures are easily identifiable and very likely to be implemented if a fund were available. A program to finance boiler tune-ups is an example of this. In Mexico, CFE has developed programs to finance motor retrofits in companies. This is an example of a fund that could be developed based upon end-use sectors.

Where Credits are Similar. Where the credit analysis can be reduced by having similar end-user credits, transaction costs can be brought down and smaller end-users reached. Credits could be used for a group of district heating utilities or for commercial property owners, for example. Some credit enhancement programs could fall into this category where instead of

offering direct funding, the fund could offer performance guaranties, extended equipment warranties or various types of insurance.

***Where Capital Demand is Large Enough to Justify a Fund*.** In order to attract certain lenders and to create a fund that is economically feasible, a certain level of capital demand needs to be assured. If fund developers can demonstrate the demand for capital, they stand a good chance of raising capital. In Brazil, it is expected that the seven largest municipal water utilities would require up to $100 million in capital to implement water pumping retrofits and control systems; this is an example of capital demand that could justify the creation of a special-purpose fund and that would interest multilateral development banks. Many of the international finance agencies, such as the IFC, have minimum loan amounts, so that the issue of capital demand is critical. In addition, the transaction costs that comprise fund management can range anywhere from 1% to 10%, requiring a certain number of transactions upon which to spread the management costs.

***To Assist an Existing Association in Marketing its Finance Program to its Members*.** Groups or associations of energy service companies, vendors, or institutions (e.g., hospitals, schools, municipalities) may find it useful to band together and raise a common pool of capital for their energy efficiency financing needs. This type of association would offer some value added in project identification, project evaluation, procurement or other areas. Individual members would have preferential access to the fund and would find the fund a useful vehicle since their financing needs would not be large enough to justify the development of a fund. The association would be responsible for marketing the fund.

7.4 Experience with Special-Purpose Energy Efficiency Funds

Examples of both successful and unsuccessful energy efficiency funds are described below.

Korea:	KEMCO
United States:	Proven Alternatives/Bank Paribas
Hungary:	Magyar Hitel Bank
Philippines:	TTEM
India:	Industrial Development Bank of India
Pakistan:	ENERCON

Korea: KEMCO. Exhibit 7-2 describes the KEMCO fund in Korea. This special-purpose country loan fund was established with a capital set-aside from the Korean Government. The fund is considered successful based upon its financing of 1,119 projects in 1994, totaling $278.5 million. Funds are loaned at below-market rates.

The fund has a two-tiered management structure. KEMCO reviews the technical merits of an application and then forwards it to a commercial bank for approval. Participating banks approve loans to creditworthy applicants and KEMCO provides the funds for the loans. The success of KEMCO is due in part to the attractive interest rates and the medium-term length of the loans, which are available from the Korean Government. Success is also attributed to a streamlined management process that relies on established commercial banks that may already have

relationships with the borrowers, and a technical staff well versed in energy efficiency projects and technologies.

United States: Proven Alternatives/Banque Paribas. In 1994, Proven Alternatives (a project development company involved in turnkey energy efficiency projects) approached a bank to develop a financing mechanism that would give the company an effective way to provide capital to its customers. Banque Paribas gave Proven Alternatives Capital Corporation a line of credit commitment that could be used when the company presented projects that met agreed-upon criteria, including acceptable credit criteria. Bank Paribas and Proven Alternatives were confident that the line of credit would be utilized. Exhibit 4-4 provides more information on this successful fund.

EXHIBIT 7-2
KOREA KEMCO FUND
(1983 to Present)

Program Objective: To encourage energy conservation and energy efficiency improvements and to reduce environmental degradation, the Korean Energy Management Corporation (KEMCO) created a fund to finance investments in these areas. The Fund financed 1,119 projects in 1994, totaling approximately $278.5 million.

Key Organizations:
- KEMCO
- Local financial institutions

Financing Mechanism: The KEMCO Fund is a dedicated source of monies loaned at special rates. It was established with capital provided by the Korean Government.

Program Description: The KEMCO Fund finances projects that fall into four main categories: mass energy supply projects, installation of energy-efficient equipment or facilities, research and development for energy efficiency technologies, and relevant survey or research projects.

A company may propose an investment plan for the installation of energy-saving and energy-efficient equipment and/or facilities by submitting an application to KEMCO. The application is first reviewed for technical integrity by a commission. If the project is approved by KEMCO, a letter of recommendation is forwarded to a related financial institution. The company files a loan application directly with the bank, which in turn reviews the overall project. If the bank approves the loan, it can then request KEMCO to provide the funds for the loan.

Thirty-two banks have entered into an agreement with KEMCO to act as Fund lenders. Interest rates are 5% per year; loans have a three-year grace period. The borrower repays the loan to the lending bank in installment payments for five years. The banks must reimburse KEMCO for the funds they receive to make such loans. The Fund will loan up to 90% of the total needed for the project. Commissions are levied at fixed rates depending upon the degree of risk for a project. A 0.5% rate is charged for high publicity and secure loans, and a 1.0% fee is charged if there is a high possibility of loan nonperformance.

Lessons Learned:
- Large numbers of projects can be put in a pipeline if there is a source of funding at a special rate and structure.

- Working with local financial institutions makes the loan review process streamlined and less costly.

Hungary: Magyar Hitel Bank. Magyar Hitel Bank has managed a special-purpose country fund for several years (see Exhibit 3-1). The success of this fund is attributable to several factors:

- Borrowers could apply some of the funds for other uses in addition to energy efficiency.
- Interest rates were below-market due to capital from the German Coal Aid Fund.
- Loan approvals were conducted by specialized staff. A technical committee reviewed the technical feasibility and a credit committee reviewed the credit aspects.
- The program was marketed aggressively by the bank.

Philippines: TTEM. The USAID-supported Technology Transfer for Energy Management (TTEM) Demonstration Loan Fund (DLF) in the Philippines has proven successful. After changes were made in the fund's terms, including raising the loan ceiling from $100,000 to $200,000, all funds under the DLF were committed in less than two years. Because of the revolving nature of the fund, it is replenished as loans are repaid.

India: Industrial Development Bank of India. Both the Asian Development Bank and USAID have been working with the Industrial Development Bank of India (IDBI) to provide financing and technical assistance for financing. In general, IDBI approaches energy efficiency as an extension of its industrial plant modernization finance programs. Bank staff emphasize this connection because they believe that the fund's success is due to the broad definition of energy efficiency and that energy efficiency alone would not have been enough to market the fund. Key selling points of the fund have been power service reliability, productivity improvements, and environmental regulatory compliance. Most of their energy efficiency financing is done on a direct balance sheet basis to their industrial customers, frequently with customers whose credit status is already known to the bank.

Pakistan: ENERCON. In Pakistan, as part of a World Bank energy sector loan, a $5 million fund was dedicated to energy conservation projects identified by the USAID-sponsored ENERCON program in Pakistan. Although ENERCON (see Exhibit 7-3) identified numerous attractive projects and completed feasibility studies on ten, these funds were never utilized. Potential borrowers cited a high interest rate, cumbersome application procedures, and uncertainty about the value of energy conservation as an investment.

7.5 Credit Enhancement for Energy Efficiency Investments

Credit enhancement is a way to access financing that has application for energy efficiency. Credit enhancement works well when specific risks have been identified as market or investment barriers. For energy efficiency, credit enhancement can be targeted to address specific barriers such as lack of end-user creditworthiness, technical risks, and operating risks.

There are two approaches to designing credit enhancement programs for energy efficiency investments. The first is to ensure that such programs are designed primarily for energy and infrastructure investments or non-sector specific investments that are suitable for energy efficiency. The second is to design programs that will act as a catalyst specifically for additional energy efficiency investments. It is recommended that both approaches be used.

EXHIBIT 7-3
ENERCON ECEP REVOLVING FUND
(1986-1990)

Program Objective: The Energy Commodities and Equipment Program (ECEP) revolving fund was established to finance efficiency measures identified as a part of USAID's ENERCON technical assistance program in Pakistan.

Key Organizations:
- USAID
- Various private sector users
- ENERCON-Pakistan's energy conservation center

Financing Mechanism: This is a revolving fund financed with the proceeds of equipment sales to private sector firms in various technology transfer and demonstration programs funded by USAID. The payments received from the private sector firms were paid to ENERCON and were set aside in a segregated fund called the ECEP revolving fund. The level of funding was Rs. 2,381,044 (approximately $50 million).

Program Description: The ECEP revolving fund was established to finance efficiency measures identified as a part of USAID's ENERCON technical assistance program. None of the studies led to the use of donor funds or investment on the part of the plant owners. The ECEP revolving fund was not utilized by any of the industrial plants provided with audits to identify efficiency options. The money was only used when the interest rate was lowered to 10% (with a 15-20% real inflation rate). Even then, most of the funds were not used for energy conservation equipment (reflective glass was the primary conservation commodity purchased).

The reasons for the fund's failure were identified in the project summary report of July 1990. The primary reasons were the poor investment climate in Pakistan in general and market barriers to energy efficiency.

Lessons Learned:
- Simply making loan funds available may not be sufficient to motivate end-users to implement efficiency projects even though the economic benefit has been established.
- Although other aspects of the ENERCON program were successful, the revolving fund was not successful because of other market barriers.

Certain general credit enhancement programs designed for all energy, infrastructure and/or non- sector specific investments will also benefit energy efficiency. For these types of credit enhancements, it is important to make sure that energy efficiency investments are eligible and that there is a high likelihood that they will be utilized for energy efficiency. These types of credit enhancements (and the way in which they can be used for energy efficiency) are:

- full or partial loan guaranties (especially useful for projects with non-creditworthy borrowers)
- guaranties of foreign exchange availability and rates (for projects with imported components)
- guaranties of later maturities on loans (for projects with longer paybacks and high societal benefits)
- guaranties of the performance of the utility off-taker (useful for utility DSM programs)
- buy-downs of interest rates (for projects with lower returns, but higher benefits to society)

- guaranties against host government changes in policies and regulations (good for utility DSM and projects using non-recourse project financing)

Suggestions for specific credit enhancement programs for energy efficiency investments are given below. These could be designed to address the unique aspects of energy efficiency such as the small size of the investment, the uncertainty of realizing energy savings, the lack of capital on the part of ESCOs, and the need for pooling and aggregating investments:

- energy savings guaranties, including a backup guaranty (or guaranty fund) for multiple ESCO obligations to guaranty savings (to promote performance contracting)
- loan guaranties to benefit local financial intermediaries that will pool, package, on-lend or develop energy efficiency lending programs (addresses the small size of projects)
- third-party bonding for performance of ESCO obligations on the installation of energy efficiency measures (to promote the development of ESCOs)
- expanded equipment warranties on energy efficiency products (to increase vendor sales)
- guaranties of equity or seed capital to be used for project development (addresses the lack of capital for project development)
- any of the above credit enhancement mechanisms when offered by utilities (to promote DSM).

7.6 Strategies for Developing Special-Purpose Funds

Ensure Fund Utilization. As already mentioned, one of the most important strategies in developing funds for energy efficiency is to identify their prospective uses, develop a solid pipeline of bankable projects, and target end-users with significant energy efficiency potential and no significant market barriers. If there is not sufficient demand for energy efficiency, combine the fund with other purposes such as renewable energy, energy supply, and sustainable development.

Take a Practical Approach. Before special-purpose funds become operational, most of them require many months or several years of organizational and development time to raise capital, identify projects and partners, develop fund criteria, and select fund management. For this reason, it is best to use special-purpose funds for projects that have the most “compelling economics” and where the capital demand is easiest to aggregate. Minimizing up-front development costs is one way to preserve the fund's viability. Targeting a fund to a group of known creditworthy end-users is another practical approach.

Develop a Business Plan for a Fund. This is an essential element in developing a fund and in raising capital. In addition to the fund's viability, the business plan would address legal and capital structure, investment strategy, underwriting practices, marketing and technical assistance, and management.

Include a Technical Assistance Component. Practitioners involved in developing funds routinely advise that a technical assistance component is desirable. Specialized skills need to be developed; this may be the first energy efficiency fund in a country.

Design the Fund to be Customer-Friendly. A key issue is defining what sells to energy users. The funds should be market- and customer-driven. If energy efficiency alone is not likely to sell, include other components, such as productivity gains. If borrowers want a “one-stop” shop for energy efficiency loans, that should be included in the fund design.

Select Fund Managers with Commitment and Skill. The success of a fund relies heavily on the performance of its managers. A management team that is strongly committed to the fund's success (“a highly motivated stakeholder”) is a key ingredient. Commitment to the fund can take the form of a financial commitment or a strong commitment to the fund's objectives. Fund management skills vary depending upon the type of fund. Local commercial banks are generally good managers and administrators for the credit aspects of funds, but as the previous examples indicate, they may not have the requisite experience in some of the technical and market areas of energy efficiency. Experienced fund managers should have a track record in managing similar types of funds.

If Too Many Market Barriers Exist, Don't Pursue the Fund Option. A special-purpose fund is not the right vehicle for every circumstance, particularly where market development and market barriers are present. In countries where energy prices remain well below the cost of production, these funds will not be likely to change the market environment such that investors will be willing to undertake energy efficiency investments. If interest rates and inflation are very high, interest in any type of cost-savings investments may be very low. In these circumstances, putting time and effort into developing a fund may be a waste of valuable resources.

Chapter 8 Financing Structures for the Next Century

The previous five chapters have discussed financing mechanisms and sources of capital that are well tested, if not in the field of energy efficiency, then elsewhere. This chapter looks toward the future, outlining three concepts that are emerging as potential avenues to finance energy efficiency investments:

- creating linkages between independent power project financing and financing for energy efficiency investments
- establishing global emissions trading within the framework of Joint Implementation (JI)
- tapping secondary markets for energy efficiency financing.

8.1 Linking IPP Financing with Energy Efficiency Financing

Many developing countries are seeking funding for new capacity through independent power projects (IPPs). But in many nations there is also a role for energy efficiency to meet rising energy demand. The last decade has seen increasing amounts of capital being invested in IPPs in developing countries; not nearly as much has been invested in energy efficiency.

Linking energy efficiency financing to an IPP financing can act as a "catalyst" for further energy efficiency funding. There are important differences in scale, users, developers, economics, and risks between the two project types. But there are also similarities, such as the utility's role and the use of debt.

The purpose of linking IPP and energy efficiency financings is not for energy efficiency investments to replace IPP projects.16 IPP and energy efficiency projects are simply too different for this to occur. The purpose of linking financing is to find circumstances where it makes sense to combine energy efficiency projects with IPPs. For example, a small portion of an IPP (approximately 10%) could be an energy efficiency component; this component would be instead of or in addition to an IPP project. The IPP and energy efficiency components would be financed with the same sources of capital.

In many instances, the national utility in a developing nation is in need of both additional power and load management as part of its operating strategy. To successfully link energy efficiency and IPP financing in developing countries, the benefits for stakeholders must be clearly defined. The advantages and/or costs of making this linkage also need to be evaluated.

Any linkage in financing between IPP and energy efficiency projects will depend on the characteristics of the two types of projects. While IPP and energy efficiency investments share similar characteristics, they also have important differences, described below.

16 The material presented here is derived from a preliminary paper, "Linking Energy Efficiency Financing to Independent Power Project Financing: Concept Paper." Hagler Bailly Consulting, Inc., and Proven Alternatives, Inc. February 1996.

EXHIBIT 8-1
CHARACTERISTICS OF IPP AND ENERGY EFFICIENCY PROJECTS

	Independent Power Project	Energy Efficiency Project
Definition	A power producer other than an electric utility.	Investment in equipment that saves energy.
Description	Generating plant that produces electricity.	Diverse range of systems such as HVAC systems, motors, drives, lighting, and controls.
Funding Instruments	Equity and long-term non-recourse debt.	Grants, low-interest loans, market-rate medium/long-term loans, leases.
Funding Sources	Equity: developers, investments funds, venture capital, utilities. Debt: capital markets, multilateral development banks, export-import banks, commercial banks.	Equity from sponsors or ESCOs, grants and low-interest loans from utilities, capital markets, lease from equipment vendors, development bank loans.
Revenue Characteristics	Revenue for electricity generated and sold. Power purchase agreements.	Cost savings from energy saved. Performance contracts.
Cost of Product	Cost to design, build, operate and retire plant.	Cost to design, install, service and maintain the energy efficiency measures.
Technical Characteristics	Greenfield construction: heavy machinery.	Sophisticated, technical, optimized, precision focus, highly engineered.
Risks	Performance, fuel costs, credit.	Measured vs. projected savings, credit, operating changes.
Project Characteristics	Large-scale focus.	Precision design and measurement, smaller- scale construction at numerous customer sites.

The main similarities are that both:

- can meet energy demand for utilities
- have developed to a great extent based on regulatory mandates
- can be financed with debt
- are greatly influenced by utility decisions
- can include the utility as a party to the transaction.

There are, however, also important differences:

- An IPP project is generally a single large investment made at a single site. Energy efficiency investments involve making a large number of small investments at a large number of sites.
- A large IPP project can cost $2 billion, while a large energy efficiency project can cost $20 million.
- Funding for an IPP project is from long-term sources of finance such as equity and debt, while funding for energy efficiency projects can be grants, low-interest loans, or medium/long-term market rate loans.
- The source of repayment for an IPP is a payment for energy produced, while for an energy efficiency project it is payments for energy saved.
- The main costs of an IPP project are the fuel and construction costs. Those for an energy efficiency project are the installation and monitoring costs.

The viability of creating such linkages is unknown. The differences between the two types of financing must certainly be addressed. Further, there are unanswered questions, including what motivation does a project developer have to pursue such linkages, especially if doing so raises the transaction costs of the project. These are some of the issues that need to be explored as this strategy is pursued.

8.2 Joint Implementation and Energy Efficiency Financing

Joint Implementation holds the potential to attract capital to energy efficiency projects that are designed under the rubric of environment or global climate change activities. Society's concerns about global warming mandate that investments be made to alleviate the environmental damage caused by greenhouse gas emissions. While power generation (fired from fossil fuel) creates local and global pollution, mechanisms for holding energy end-users accountable for the environmental consequences of their energy use have not been widely applied.

Frequently, the social cost of energy use is greater than the private cost paid by the end-user. Basic economic principles stipulate that if end-users bear the higher societal cost, the quantity of energy demanded will decrease. However, energy end-users have not been able to capture the value of the environmental benefits of their energy efficiency investments: decreased generation and hence, reduced pollution levels. Because these benefits are shared by all those in the affected region (or world in the case of CO_2 and other greenhouse gas emissions), the amount of private investment in energy efficiency is below the socially optimal level.

One effort that has been spurred by concerns over global warming and that holds promise for providing financing mechanisms for energy efficiency investments is Joint Implementation. The United Nations Framework Convention on Climate Change (UNFCCC), signed at the Earth Summit in Rio de Janeiro in 1992, defines a comprehensive framework for the development of greenhouse gas abatement and absorption policies. In order to mitigate the climate change that may result from greenhouse gases, the UNFCCC endorses the policy of Joint Implementation (JI).

Joint Implementation refers to climate change programs in which certain countries seeking to return to their 1990 greenhouse gas emission levels by the year 2000 undertake activities to reduce emissions or enhance greenhouse gas sinks in conjunction with partner countries. A wide range of arrangements can be made between entities in two or more countries to accomplish this.

For example, suppose that a U.S. utility or other company needs to reduce its greenhouse gas emissions, but it has already undertaken the cost-effective pollution reduction measures available to it in the U.S. Facing limited or expensive mitigation options, the utility seeks a partner in another country with which it can pursue more cost-effective emission reduction opportunities. In this international cooperation effort, the utility might fund an energy efficiency project in the partner country, which would substantially reduce energy use and pollutants at far less cost than the utility would incur making similar reductions in the United States. In essence, the U.S. utility has invested its capital in an emission reduction project in exchange for emissions credits.

Discussions on specific financing mechanisms are on-going and pilot projects are being developed. One such pilot project is the Decin Boiler project in the Czech Republic. This project will convert a local district heating facility from high-polluting lignite coal to natural gas cogeneration (see Exhibit 8-2). It provides a good example of coordination between “macro” and “micro” players with involvement by a non-governmental organization and three U.S. investor-owned utilities.

EXHIBIT 8-2
THE DECIN PROJECT
(1995)

Program Objective: The City of Decin in the Czech Republic has initiated a project to convert one power generation plant from brown coal to more efficient natural gas. A 1991 study conducted by the Danish consulting firm of Brunn & Sorensen identified the city's district heating system as a main source of air pollution.

Key Organizations:
- Wisconsin Electric Power Company
- City of Decin
- Edison Development Company
- NIPSCO Development Company
- Center for Clean Air Policy

Financing Mechanism: Three U.S. utilities are providing interest-free loans to the City of Decin in return for 100% credit on the CO_2 emissions reductions gained as a result of the project. The loan will partially fund the project; the balance of the project costs will be financed through grant aid and loans from the Czech State Environmental Fund.

Program Description: Decin, located in Northern Bohemia, is an industrial center with a population of 55,000. The area suffers from high levels of air pollution, exacerbated by its geographical location at the bottom of a deep valley. Brown coal is used to fuel the district heating system, providing heat to many of the city's housing units. The City of Decin needed to convert one of the district heating plants - the Bynov District Heating Plant - from coal to natural gas and install gas engines for more efficient generation; the City found, however, that they could not afford the conversion.

Three U.S. utilities, working with the Center for Clean Air Policy, are providing a thirty year, $600,000 interest-free loan to the City of Decin. The loan will partially fund the plant conversion, the installation of internal combustion engines and gas/hot water heat exchange equipment, and assistance in improving the efficiency of the hot water distribution network. The U.S. financing was leveraged for additional assistance; the Czech State Environmental Fund will provide financing for the balance of the project costs (the total capital investment is estimated at $8 million). Financial assistance from the State Environmental Fund will be evenly split between grant aid and loans. Since the City of Decin will retain ownership of the Bynov plant (a newly formed company, Termo, will own three other district heating plants that service the city), the city will assume the repayment obligations of the loans. The plant will be managed and operated by Termo under a long-term lease agreement with the city. A ground-breaking ceremony was held in September 1995; the plant is expected to be completed by August 1996.

Lessons Learned:

- Joint Implementation proved to be a catalyst for first securing financial assistance that kept the project on the table, and then for leveraging this funding for greater resources that allowed the project to be implemented. Nevertheless, the incentive provided by Joint Implementation for utility participation (currently, it is on a voluntary basis) exists only in the future and is based on expectations.
- The three participating utilities have negotiated with the City of Decin that, in return for their $600,000 investment, the utilities will receive 100% credit for the resulting emissions reductions. And yet, the $600,000 loan represents only 7.5% of the total estimated capital investment.

Benefits to Joint Implementation

In addition to the global benefits of reducing greenhouse gas emissions, there are benefits to JI that are distinct for the initiating entity and the host country participant. The initiating entity gains:

Access to New Market Opportunities. The global markets for new technologies and energy and natural resource management services are growing rapidly. The JI framework eases market access barriers for countries seeking new market opportunities for the export of technologies and services.

The host country's and host country participant's benefits include:

Technology Transfer. JI encourages private sector entities in one country to invest additional resources in the dissemination of innovative technologies in another country that can help that country meet development priorities while reducing or sequestering greenhouse gas emissions.

Facilitation of Investments. By reducing transaction costs, JI facilitates investments in technologies and projects that reduce greenhouse gas emission while contributing to overall host country development objectives.

Local Economic Benefits. JI projects may generate local economic benefits through training, construction of new or improved facilities, public participation in projects, or provision of new energy services.

Challenges to Joint Implementation

A unique aspect of JI projects is the abstract quality of the central commodity, greenhouse gas emissions. The international community has not yet developed a system for valuing such credits. This characteristic must be addressed if the economics of JI activities are to be a significant drawing card.

The challenges of JI depend in part on the participants' goals. For example, a participant seeking out a new investment might believe the transaction and reporting costs are a significant obstacle. Other participants might be seeking to meet an emissions reduction commitment. Their challenge is the lack of a credit transfer mechanism. The challenges to JI include:

No Emissions Credits Before 2000*.* Activities implemented during the pilot phase will not be credited toward the existing commitments of industrial countries to return to their 1990 emissions levels by 2000. Even if emissions credits earned now could be applied to national emissions reduction obligations, concern remains over estimates of future emissions and how those estimates will be affected by changes in the local and global economy, politics and technology.

No Credit Transfer Mechanism. Currently there is no mechanism to transfer credits to a third party that might be involved in project implementation (e.g., equipment or services suppliers). This complicates contract structures and becomes a hurdle in attracting investors.

Unresolved Contracting Issues. A well structured JI program must be transparent and simple to arrange, administer, and monitor. But contracting issues for JI programs remain complex, due in part to the long-term nature of these projects. Some of the important contracting issues that must be considered include:

- assignment of greenhouse gas emissions reduction or sequestration benefits
- project monitoring and verification provisions
- risk management.

These restrictions, as well as the recent action of the Conference of the Parties in Berlin to withhold CO_2 emissions credits until 2000, have produced serious investor concerns about the profitability of JI projects in terms of the immediate and short-term values of CO_2 credits. In the long run the value of these credits will certainly be agreed upon. Currently, however, it is impossible to determine their value.

8.3 Tapping Secondary Financial Markets for Energy Efficiency Financing

Accessing secondary financial markets for energy efficiency financing is about to occur in the United States, and could be a mechanism for financing energy efficiency in other countries. The U.S. Department of Energy is leading the effort to create a secondary market for energy efficiency and their efforts may be applicable to other countries in the future. There are at least three applications that are being pursued: 17

- financing for energy efficiency building retrofits
- refinancing of utility demand-side management investments
- securitization of utility customer credits.

Financing for energy efficiency building retrofits. Access to secondary markets for building retrofits would allow the market for building retrofits to increase substantially. The market would expand to include the many economically attractive retrofit opportunities in public, commercial, federal, and academic institutions. Throughout the world this is a market that is enormous with returns in the 20% - 25% range, but low levels of investment. In many instances, especially in the public sector, a shortage of available capital is clearly a constraint and where many building owners such as municipalities may have credit problems as well.

The approach to financing building retrofits is to create a new secondary financial market. This would provide a mechanism where any institution would be able to sell its stream of incremental cash flow from energy savings to a financial institution. A good example of how this works is with home mortgages. The interest of financial institutions is based upon the confidence that the loan documentation is standard and the average default rate on the package of loans is low and predictable, perhaps in the 1-2% range. By working with large volumes, risk can be controlled, and through standardization of documentation, risk can be reduced.

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17 Greg Kats, U.S. Department of Energy. "Secondary Markets for Energy Efficiency." *Energy Efficiency New & Views,* V1#2, May 1995.

The approach to standardization is key. Generally there is little consistency in the way building retrofits are conducted and there is a wide range in the quality of the retrofits. This does not offer any degree of confidence to financial institutions. However, if financial institutions could be made confident, they would be willing to lend for these projects.

The U.S. Department of Energy, along with state agencies, utilities, energy service companies and financial institutions, worked cooperatively to establish a national consensus on a monitoring and verification protocol that will provide the uniformity and consistency in quality that financial institutions require (see Exhibit 4-5). The strategy is to begin with transactions in the $20-30 million range and quickly add to these so that the total market grows to $300-$400 million and, within 3-4 years to $5 billion. It is estimated that the U.S. market potential for building retrofits is $135 billion. The creation of a secondary financial market may be the only way to channel capital to this market.

Refinancing of utility demand side management investments. In the U.S. many utilities have energy efficiency investments on their balance sheets that are being depreciated. Sales of these assets, based upon their ability to generate future cash flows, can be made to financial institutions.

Securitization of utility customer credits. Utilities that develop credit programs for their customers, especially residential customers, can sell these loan portfolios through a securitization process. This would be done in a similar manner to the securitization of consumer credit card loan portfolios.

8.4 Recommendations

None of the concepts presented in this chapter is well developed, and only JI has been subjected to pilot tests. Clearly, then, the foremost recommendation is to seek out test projects or programs and to work with the issues, some of which are very significant. The U.S. JI program, for example, has accepted 31 projects, many of which are already under development. The other recommendation is to be open-minded, think creatively, and seek out new methods for financing energy efficiency.

Chapter 9 Conclusions and Recommendations

This chapter sets forth overall conclusions and provides recommendations for strategies and stakeholder actions. Overall conclusions are drawn from the twelve case examples presented in the report and an analysis of pervasive themes. A discussion of the ten “best” strategies follows. These are the strategies that have been selected as the most likely to increase the amount of financing that can be made available for energy efficiency investments over the next decade. The final section provides recommended actions for each type of stakeholder.

9.1 Observations from Case Examples

Throughout the report, cases are used to demonstrate actual examples of energy efficiency financing. Twelve cases are presented in detail and many other examples are mentioned. The cases were selected to demonstrate various strategies for obtaining financing and to illustrate how financial structures and partnerships have been used. Exhibit 9-1 provides a summary of the cases. Several observations regarding the cases can be made and are discussed here.

Importance of Government Incentives. Nearly all of the cases presented involve some form of government incentive. The pervasive presence of government incentives underscores the need for incentives and the important role for policy makers in the support of energy efficiency investments and financing. Government incentives described in the cases include:

- tariff reductions on imported equipment
- below-market interest rates on loans
- tax incentives such as accelerated depreciation for energy-efficient equipment
- free industrial energy audits
- cash grants
- subsidized prices for energy-efficient products
- technical assistance in project identification and development.

The one exception to this is the Proven Alternatives/Banque Paribas line of credit (Chapter 4), which benefits from no specific government involvement. However, it should be noted that this project is located in the United States where the overall regulatory framework for energy efficiency has been very favorable over the last ten years.

Limited Range of Financing Sources. The financing for the projects described in the cases are provided by a limited number of institutions - utilities, governments, multilateral lenders and commercial banks. Some of the commercial bank financing is provided by foreign donors and on-lent with commercial banks acting as fund managers. There is little involvement of local capital markets in these cases. This points to the problem that the sources of financing for energy efficiency have been limited.

Examples of New Partnerships. Several of the cases involve new partnerships especially, between utilities and commercial banks and equipment vendors. Two cases, the Asian Electronics case in India and the Industrial Motors project in Mexico, are good examples of successful partnerships between banks, equipment vendors and utilities.

In both cases equipment vendors worked closely with utilities to structure a financing mechanism. In India the lease financing mechanism was structured to allow the electric utility to obtain financing for power factor correction devices. In Mexico, commercial bank financing was arranged by motor manufacturers to allow the electric utility's industrial customers to obtain financing for adjustable speed drive motors. In these two cases, the combined interests of the vendors and the utilities was relied upon together to obtain the support of the commercial banks. These are both good examples of the types of partnerships needed to allow energy efficiency projects to move forward.

All Types of End-Uses Included. The twelve cases presented represent a good mix across end-use sectors. As shown in Exhibit 9-2, the cases include investments made in the industrial, residential, commercial, and utility sectors. The conclusion to be drawn is that these cases demonstrate that investments in all end-use sectors can obtain financing. It should be noted that all of the residential programs include participation by utilities.

9.2 Overall Themes

Four major themes emerge from this report. These themes pervade nearly every discussion of energy efficiency financing. While these themes may appear obvious, they are worth including here since they heavily influence the selection of financing strategies and recommended actions for stakeholders that are discussed in the next section of this chapter.

Build New Partnerships. New partnerships between energy efficiency stakeholders can close the gap between "micro" and "macro" players***.*** The gap results from the different objectives each is trying to achieve: in simplified terms, macro players see energy efficiency as providing benefits to society, while micro players seek profit maximization. As noted above in observations from the case examples, few of the energy efficiency projects that have obtained financing are "pure" private plays; most of them have received some type of financial support and incentive from a macro player. Developing partnerships between micro and macro players is often necessary to successfully implement financing on a large scale. To this end, macro players should work more closely with micro players to develop programs which meet both of their needs.

EXHIBIT 9-2 Representation of Cases in End-Use Sectors		
Selected Examples	**End-Use Type**	**Financing Mechanism**
Hungary - Special Purpose Commercial Bank Fund	Industrial	Commercial bank administered revolving fund
United States - Proven Alternatives Fund	Industrial	Dedicated line of credit for Proven Alternatives' customers
Czech Republic - Bulovka Hospital	Commercial	Performance contract financed by commercial bank with vendor guaranty.
India: Asian Electronics Ltd.	Utility	Vendor lease financing
Guadalupe/Martinique CFL Program	Residential/Utility	Utility financing
Mexico: Industrial Motors Project	Industrial/Utility	Financing from utilities and vendors
Mexico: Ilumex Lighting Project	Residential/Utility	Utility managed revolving fund, utility acts as collection agent.
Poland: Efficient Lighting	Residential	Grant funding for bulk purchases

Market Fragmentation Requires Multiple Approaches. The list of types of investments that are called energy efficiency (shown in Exhibit 9-3) leads to the observation that this is a fragmented market. This influences the sources of financing, the types of terms likely to be available, and the financial structures that are appropriate. This is not the case with other types of energy investments where, for example, an electric power generating plant has standard types of project costs, requiring only a handful of financial structures, such as corporate financing or non-recourse project financing. For energy efficiency projects, many more financial structures are needed.

Project and operating costs for energy efficiency investments also vary widely. Some energy efficiency investments consist primarily of maintenance and ongoing services, and their financing needs may be mostly for working capital. For other projects, significant equipment installation and ongoing measurement and monitoring requirements mean that in addition to capital equipment, a large services component needs to be financed.

Strategies Need to Reflect an Understanding that the Barriers to Market Development are Different from the Barriers to Financing. The lack of financing is an often cited constraint to the widespread implementation of energy efficiency. In many instances, however, the problem is not only the lack of available capital but also market imperfections. The most obvious example of this is where energy prices do not reflect the real costs of energy production.

If energy prices are low, rates of return on energy efficiency investments will be unattractive and the demand for financing will be too low to interest financial institutions. This is an example of a market barrier, not a financial barrier. It is only one of many examples of market barriers that are often mistakenly described as constraints to financing. The response to addressing market barriers is two-fold.

First, actions that make the market more attractive are required. Second, it is necessary to put finance in the context of market development and recognize that the availability of financing can in certain circumstances help create a market. Project development is stymied without clear, ready access to financing. Too often, the project development phase focuses on issues of engineering feasibility and energy efficiency potential while ignoring financing and contractual issues. This “financial engineering” dimension is essential to draw capital to projects. Additional support for the project development phase can be very helpful in market development and creating demand for financing.

Financing Can be Increased by Acting Programmatically. The financing challenge posed by large numbers of small projects can be addressed by taking a programmatic, as opposed to a project-by-project, approach. During project development, several energy efficiency projects can be aggregated or bundled into programs. In this way, projects can develop access to traditional capital markets by aggregating capital demand. An effective investment strategy begins by developing financing relationships with market players who have a broad reach and can address the project development and financing needs of large numbers of end-users in specific sectors. These parties include electric utilities, government agencies, local development banks, end-user associations, some non-government organizations, and end-users with several facilities.

9.3 Ten Best Strategies

Ten strategies are described in this section. While most of the strategies are specifically for financing, included also are policy recommendations and a market strategy since the issues of financing, policy and marketing are closely related. The strategies combine traditional and innovative approaches. While nearly all of the financing strategies can be pursued over the short and medium-term, it should be acknowledged that the policy recommendations and market strategies can take longer to implement. Pursuing the strategies listed below cannot guarantee increased financing for energy efficiency. They are, however, a combination of strategies that have worked in the past and hypotheses based on the authors’ best judgment.

Financing Strategy #1: Aggregate Groups of End-Users by Type and Locate Financing. Strategies that aggregate the market by type of end-user or type of investment are a valuable way to address critical issues common to groups of energy consumers such as end-user creditworthiness, the small size of the investment, and the lack of collateral value. End-users can be aggregated by type of institution (municipality, industrial, institutional, or agricultural) to take advantage of the similarities in end-user credits. Or, associations that can bring together multiple end-users can be identified. Vendor groups and trade associations may be able to play these roles.

Large amounts of capital may be made available by aggregating projects into programs, such as a financing program to install thousands of energy-efficient motors throughout a country, a loan from a multilateral development bank that allows all of the municipal water utilities in a nation to retrofit their water pumping stations, or the mass production of metering devices that could be installed in unmetered customer facilities on a cost-effective basis. Where programs and projects can be aggregated, packaged, or bundled to reach amounts between $1 million and $50 million, financing can be more readily obtained from local financial institutions, and where appropriate, international financial institutions. Aggregating projects may also be a useful approach for Joint Implementation projects.

Financing Strategy #2: Increase the Participation of Commercial Credit Providers. These traditional providers of credit are a large and nearly unutilized source of credit for energy efficiency, and actions should be taken to involve them. Important sources of financing are leasing companies and local commercial banks. Leasing is a growing business in many developing countries which lends itself well to some of the specifics of energy efficiency financing: large numbers of small credits and end-user creditworthiness. Local financial institutions may not have capital to lend from their own resources, but are in a good position to play other important roles in energy efficiency financing:

- financial intermediaries with international institutions
- facilitators and financiers for trade transactions
- direct lenders and guarantors
- lessors
- mortgage and construction lenders
- fund administrators and agents
- experts in local business conditions and customer credit.

Actions that enable local financial institutions to begin energy efficiency lending would directly support this strategy. Such actions, further described in the next section, include providing technical assistance to financial institutions to allow them to identify and evaluate energy efficiency projects.

Financing Strategy #3: Increase the Amount of Vendor Financing Available. Accessing export credit financing and pursuing vendor-supported financing programs is another under-utilized source of financing for energy efficiency. In some countries, vendors are the most “motivated” stakeholders and are thus in the best position to drive the financing. In addition, some of the energy efficiency equipment vendors are large multinational corporations with access to attractive rates and innovative financial products. In addition, export credit financing programs are often well established and operating smoothly, but to date have limited applications to energy efficiency.

In some cases energy efficiency projects may not be large enough to access direct financing from export credit agencies, but there is no reason why such financing cannot be made available to equipment distributors through local financial institutions that have lines of credit with export credit agencies. Companies already pursuing some form of vendor financing include Phillips, Honeywell, Johnson Controls, and Landis & Gyr.

Financing Strategy #4: Obtain Funding for ESCOs. ESCOs traditionally need access to financing as a tool to market their services, but have found that access to financing is a significant barrier in developing countries and emerging markets. ESCOs play an important role in project identification, project development, project implementation and project evaluation. Most ESCOs work on a project-specific basis, seeking to develop a portfolio of projects. For ESCOs to be effective, they need both debt financing for their customers, and equity financing for their own marketing and project development needs and in some cases for equity contributions to specific projects. In order to attract investors and lenders for performance-based contracting, ESCOs need to demonstrate financial strength, a good track record, and a strong pipeline of projects. Possible sources of equity for ESCOs include strategic equity partners (utilities, large engineering firms, venture capital firms); possible sources of non-recourse debt include international finance institutions and private institutional investors. For debt with recourse to customers, commercial banks should be a good source of financing to pursue on a project-specific basis.

Financing Strategy #5: Promote Utility Involvement in Energy Efficiency Financing. Electric utilities can be powerful players in energy efficiency. Demand-side management programs can save utilities money, provide benefits for end-users, and act as a market pull for vendors and service companies. Utilities can provide direct credits, subsidized credits and rebates; act as collection agents with their customers; and offer a wide variety of credit enhancements for projects. For these reasons, involving a utility in an energy efficiency financing makes good sense wherever possible. Many utilities in North America have experience in program design and thus are good partners to act programmatically.

The key to involving utilities is understanding the incentives that will motivate them to participate in energy efficiency. The model of the United States where utilities have been allowed to recover the costs of demand-side management programs in their rates is not likely to be a model that is widely adopted; therefore, more attention will need to be directed to motivating utilities to undertake energy efficiency. (See Chapter 6 for utility incentives.) Once a utility is involved, it can be encouraged to find ways to share the costs of energy efficiency investments with its customers. Designing credit programs for customers is a good strategy for doing this.

Financing Strategy #6: Establish Country- and Region-Specific Energy Efficiency Funds. Special-purpose funds can be a good strategy provided they are well structured, their uses fairly well planned, and they are targeted to where demand is known. Funds are a good way to access both private and public sector sources of financing, as well as to lower the overall cost of financing. In the development of special-purpose funds, it is important to select a structure and management team that will ensure the fund's utilization. Given the specialized nature of energy efficiency project evaluation, a technical assistance component may be desirable.

Financing Strategy #7: Develop Financing Mechanisms for the 21st Century. It is not too soon to be looking to the future for new, innovative structures and sources of financing. Three types of financing mechanisms are discussed in the body of this report: emissions credits through joint implementation, linking energy efficiency financing to independent power project financing, and tapping into secondary markets to access new sources of energy efficiency financing. However, these are just three mechanisms and there are many more. The strategy recommendation from this report is to think creatively, always be looking for new structures and financing opportunities, and develop a long-term perspective.

Financing Strategy #8: Build Management, Technical, and Institutional Capability. While building these capacities is not directly a strategy for financing, it is often a critical prerequisite in countries where the energy efficiency industry is not well developed. Capacity building actions that would more directly support financing include:

- enhancing engineering capabilities for energy efficiency project design and evaluation
- providing project development and loan packaging support for financial institutions and energy conservations agencies
- training financial institutions in energy efficiency project evaluation
- building the organizational capabilities of government policy makers, conservation agencies and associations.

Financing Strategy #9: Continue Energy Sector and Market Reforms. Government policies that support economic reforms and growth in general will be beneficial for energy efficiency financing. Specific energy sector reforms and direct incentives for energy efficiency can have a much more direct impact. The removal of price subsidies and the incorporation of environmental costs in energy prices are two important policy actions. Trade and investment liberalization has also proven to be helpful for energy efficiency, as have investment incentives. Since every country is different, it is not possible to recommend specific reforms; however, it is important to identify known market failures and develop policies that specifically address these market failures.

Financing Strategy #10: Increase Market Penetration of Energy Efficiency Goods and Services. Two approaches are recommended to increase market penetration. The first is to increase the energy efficiency component of investment in new plant and equipment. This is important in countries with high economic growth where the market for new investment significantly exceeds the market for energy retrofits. Various types of financing are likely to be available for new investments, and the energy efficiency component may be able to easily obtain financing as part of the overall purchase or investment. Initial actions here include conducting market research and developing marketing strategies to identify countries with high potential. Later actions include locating partners, executing marketing strategies and working with local governments on the promotion of market and investment incentives.

The second approach is to increase the local availability of energy efficiency products through local manufacturing and distribution. Increased product availability, after-sales service and equipment warranties, and a reduction in foreign exchange requirements will help bring about the increased use of energy efficiency products.

9.4 Recommended Actions for Stakeholders

Many opportunities exist for stakeholders to pursue the strategies described above. Each stakeholder can take concrete steps to ensure that more financing is made available for energy efficiency in the future. The suggestions offered in this chapter provide recommendations for stakeholders to act in both traditional and innovative ways. In addition, recommendations are made to suggest ways in which various stakeholders can form partnerships and coordinate activities.

Bilateral Donor Agencies. Donor agencies have an important role to play in several of the strategies listed in Section 9.2. Traditionally their role has been most evident in the policy, marketing and technical aspects of energy efficiency, a role which continues to be very important. Also recommended is for donor agencies to play a role in increasing the sources of financing available and in providing assistance for project and program development. Recommendations for donor emphasis are as follows:

- **Take a leadership role in keeping issues related to private investments and financing for energy efficiency on the policy agenda**. In this sense energy efficiency can follow in the footsteps of the policy assistance provided to local governments in support of independent private power (IPP). With IPPs, donor agencies, such as USAID, took a lead role in creating awareness, suggesting policy recommendations, and promoting private sector investments and financing in many developing countries. This was done through a series of publications, seminars and workshops, policy dialogues, and trade and investment missions. A similar approach could be taken for energy efficiency financing. Through a series of publications, seminars and workshops, awareness could be increased and private investments promoted.

- **Target assistance to countries where the role of energy efficiency in energy sector restructuring is unclear, but the developmental benefits of energy efficiency are high.** Targeted countries could include those where energy intensity remains high, where power shortages exist or are expected, and where environmental issues of air pollution and global warming are serious. In these countries a strong justification for policy support for energy efficiency can be presented to energy policy-makers in central and local governments, to regulators, legislators and senior utility executives.

- **Provide technical assistance, training, and capital to encourage financial institutions to finance energy efficiency investments**. Many financial institutions are unaware of what constitutes and energy efficiency investment. They are also unaware of how to market to potential borrowers and how to evaluate credits for energy efficiency projects. Technical assistance and training directed to financial institutions would be very useful. Specific tasks could include some of the following:

    - developing marketing plans for existing lines of credit
    - offering training in project evaluation and credit analysis
    - providing assistance in loan structuring and documentation for energy efficiency
    - conducting seminars and workshops to promote financial institution participation
    - facilitating the creation of special-purpose funds
    - providing seed capital or credit enhancement for special-purpose funds.

- **Support project and program development and developers.** On a targeted basis, donors can select priority countries and regions where project and program development can be assisted through project identification and investment promotion. USAID is currently conducting this type of technical assistance for energy efficiency programs in Brazil and Mexico. The rationale for this type of assistance is based upon the understanding that energy efficiency projects and programs have very high up-front development costs. In selected countries, activities that target ESCOs in their marketing and project development efforts could be supported by donors.

- **Support market development activities.** The type of assistance offered can be adapted to the stage of market development and institutional capacity in each country. In power-short countries, for example, market development activities could promote private sector trade and investment in energy efficiency where market opportunities are known to be attractive and project economics already compelling. In other countries, where market conditions are poor, assistance could be provided to improve market conditions. Such assistance could consist of pre-investment activities, primarily policy recommendations and institutional capacity building.

Multilateral Development Banks. Most of the multilateral development banks are already active in energy efficiency. For example, The European Bank for Reconstruction and Development (EBRD) has created an Energy Efficiency Unit which is identifying financial intermediaries for on-lending programs and providing direct lending for larger projects such as district heating. The World Bank has designed several energy efficiency components in power sector loans to electric utilities. The Asian Development Bank has worked closely with development finance institutions in India on energy efficiency lending policies and practices. These are just some examples. The recommendations included here are intended to offer suggestions on ways to approach loan design, define technical assistance requirements, and develop policies for additional energy efficiency lending.

- **Pursue additional direct lending opportunities for demand-side management programs.** Many multilateral development banks are traditional lenders to electric utilities and as such, are in an excellent position to consider additional lending to utilities for energy efficiency. Considerable untapped potential exists for direct loans to utilities for load and demand-side management programs. In order to do this, it is important that power sector investment officers acknowledge that DSM programs almost always require that significant attention be given to initial program design and ongoing program evaluation. This means that initial as well as ongoing project costs will include higher amounts for services (technical assistance and institutional building) than traditional power sector loans. Utility managers in all functions may require technical assistance in designing efficiency loans.

- **Work with electric utilities and government agencies to put in place incentives for energy efficiency**. As discussed in Chapter 6, utilities must have an incentive to consider energy efficiency investments. Incentives can be regulatory or market-based. Additional technical assistance in the design of utility incentives is recommended.

- **Leverage utility-financed demand-side management with private sources of financing.** Utility financing of DSM programs presents an opportunity to broaden the sources of financing available for energy efficiency. Several recommendations are offered:

    - *Co-financing with export credit agencies.* Many component parts in energy efficiency projects consist of imported equipment which lends itself to financing on attractive OECD consensus terms.

    - *Parallel financing from commercial banks.* Commercial banks can participate in financing a portion of electric utility customers' energy efficiency projects.

- *Cost-sharing with energy-users.* Utilities can require that end-users pay and arrange for the financing of a portion of the project costs.

- *Partial capitalization for special-purpose funds.* Another method of leveraging is for multilateral development banks to provide partial capitalization for a special-purpose fund with the remaining capital coming from private sources.

- Identify new borrowers for energy efficiency loans and loan components. Electric utilities are only one type of borrower able to implement energy efficiency. Working with other types of borrowers is one way to implement a strategy of aggregating end-users. Municipalities seeking to undertake municipal lighting projects, district heating requiring rehabilitation of older plant and equipment, water utilities that want to undertake motor retrofits for pumping, and housing authorities looking to build energy efficient homes are examples of borrowers that can aggregate multiple projects. Borrowers for industrial restructuring loans are good candidates for energy efficiency components where the energy efficiency benefits provide a portion of total industrial productivity improvements.

- Develop mechanisms to work with a wider range of intermediaries. Energy efficiency lending differs from traditional power sector lending because the large number of small projects requires a greater reliance upon intermediaries. Developing a network of service providers is also a good mechanism for market development. The following actions are suggested:

    - *Identify and qualify intermediaries. Possible intermediaries include local development banks, commercial banks, utility credit departments, or energy-users associations, energy service companies, government conservation agencies and non-governmental organizations. Qualification of intermediaries includes an in-depth assessment of their ability to manage a portfolio of energy efficiency projects and loans.*

    - *Develop structures for working with intermediaries. Possible structures include utilities contracting with commercial banks or leasing companies for the management of an energy efficiency program, contracting with energy service companies for the delivery of energy efficiency savings, or providing loans to government energy conservation agencies or non-governmental organizations to implement programs. Protocols for working with intermediaries would also include ways to customize on-lending programs by paying close attention to the criteria for on-lending. Possibilities for incorporating performance contracting in relationships with intermediaries is also worth considering.*

- Review policies to ensure that energy efficiency is properly addressed. Several policy issues related to energy efficiency should be reviewed on an ongoing basis to ensure that the following are addressed.

    - *Is there a procedure for considering the possibility for including an energy efficiency component in multilateral development bank loans, and is this procedure effective?*

- *Does the bank prepare any "readiness" indicators to assess the potential for energy efficiency in a given country? Are procurement policies flexible enough to accommodate the specific financing requirements of energy efficiency investments, and if not, what can be done to change procedures?*

- *Do bank practices adequately accommodate the unusually high up-front design and evaluation requirements inherent in energy efficiency projects?*

- *How can loan conditionality be used to advance strategies for energy efficiency market development?*

Local Government Energy Agencies. Local government energy agencies generally have responsibilities for energy policies and programs and regulation on a central or local level. In each of these functional areas, they can participate in strategies to increase financing for energy efficiency. Recommendations are as follows:

- Support policies that create favorable market conditions for energy efficiency. This broad policy objective is probably the most important objective that local governments can pursue in order to increase financing for energy efficiency. Specific actions that can be taken to meet this objective are as follows:

    - *Support pricing methodologies that reflect full production costs, variable demand conditions, penalties for power factor, and time-of-day pricing.*
    - *Endorse macroeconomic and sector policies that remove market and investment barriers to energy efficiency.*
    - *Promote building codes and appliance standards.*
    - *Consider regulatory incentives for energy efficiency.*
    - *Implement energy efficiency investment incentives such as accelerated depreciation.*

- Develop programs that act as incentives to increase the level of private sector financing for energy efficiency. This is another broad objective that can be met through a wide range of actions. Some actions that can be taken to meet this objective are as follows:

    - *Offer project development and financing programs to the private sector including energy audits, feasibility study funding, and project development loans.*
    - *Develop programs that support the utility's efforts to implement energy efficiency.*
    - *Conduct campaigns that increase awareness of energy efficiency among new players, such as commercial banks, leasing companies and other financial institutions.*
    - *Provide program support for energy service and equipment providers by offering certification, by organizing associations and promoting new partnerships between stakeholders.*
    - *Act as a coordinator and clearinghouse for information exchange and programs.*

Electric Utilities. As mentioned in Chapter 6, utilities can be powerful players for energy efficiency provided they have incentives. In support of energy efficiency financing, utilities can take on the role of financial services provider, facilitator, collection agent or payor/buyer. The

three areas of recommended actions listed below are only some of the actions that utilities can undertake.

- Develop utility incentives for energy efficiency. As mentioned many times throughout this report, utilities are in an excellent position to provide financing and other types of support for energy efficiency. However, without clear economic or regulatory incentives, utilities are not likely to be interested in energy efficiency. Actions to develop incentives include the following:

    - *Determine values for saved energy*
    - *Conduct integrated resource planning*
    - *Consider efficiency investments as a means to avoid investment in transmission and distribution*
    - *Develop energy efficiency programs as a new value-added product.*

- Encourage traditional power sector lenders to provide financing for energy efficiency investments. In addition to obtaining new sources of financing for energy efficiency, obtaining financing from existing lenders is in many cases an underutilized source of financing. Required actions to obtain financing from existing lenders include the following:

    - *Develop improved load management programs; conduct load research that connects to metering for enhanced measurement and load management*
    - *Obtain technical assistance and training in the design and evaluation of demand-side* management programs.

- Leverage funding for demand-side management with private sector financing. Utilities that undertake demand-side management programs can extend the reach of their programs by leveraging funding. This can be done by building new partnerships with financial institutions and end-users. Some suggestions are as follows:

    - *Play a role in the development and operation of financing programs that support customers' investments in energy efficiency*
    - *Develop partnerships with local financial institutions to implement credit programs for end*-users.

Local Commercial Banks. As described in Chapter 3, it recommended that commercial banks take actions to learn more about energy efficiency investments and financing, to find suitable partners, and organize the market. The following are some suggestions:

- *Team up with a technical group to review energy efficiency applications jointly*
- *Obtain technical assistance in loan evaluation.*
- *Offer an equipment vendor a vendor financing program*
- *Obtain a line of credit from an export credit agency to finance import of energy efficient equipment.*
- *Provide incentives for loan officers to make energy efficiency loans.*

Energy Service Companies. Recommended actions include:

- *ESCOs should enter into joint ventures with larger companies to obtain equity and working capital for project development*
- *ESCOs should customize performance contracts to be more adaptable to developing country conditions and smaller projects*
- *Work with local government agencies and donors to improve market conditions*
- *Continue to identify, develop and obtain financing for projects.*

International Financial Institutions - Investment and Export Credit Agencies. Export credit agencies and international private sector investment agencies also have important roles to play in financing energy efficiency. For the most part, international investment agencies must identify projects of a certain minimum size. Some actions to do this include the following:

- *Include energy efficiency projects in investment funds for other energy investments, such as* IPPs.
- *Consider credit enhancement mechanisms for energy efficiency.*
- *Provide capital for a special-purpose country or regional energy efficiency fund.*
- *Aggressively promote energy efficiency as an "environmental investment" along with renewable, environmental, and green investments.*
- *Provide demand-side management financing for privatized utilities.*
- *Identify local commercial banks that have experience with energy efficiency and provide them with credits and technical assistance.*
- *Work with equipment vendors to craft financing mechanisms to suit their needs.*
- *Identify energy-efficient investment opportunities within the existing portfolio of loans.*

Non-Government Organizations. Non-government organizations can play important roles working to advocate policies and implement programs. In the area of financing, it is recommended that the emphasis be on the following:

- *Provide policy recommendations in areas of expertise.*
- *Participate in project identification, project development, and market development as a facilitator, expert, and intermediary.*
- *Provide information exchange services.*
- *Offer venture capital for special-purpose funds or selected investments.*

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ACRONYMS

ADB	Asian Development Bank
CFL	compact fluorescent lamp
DSM	demand-side management
EBRD	European Bank for Reconstruction and Development
ECA	export credit agency
ESCO	energy service company
GEF	Global Environment Facility
HVAC	heating, ventilation and air-conditioning
IFC	International Finance Corporation
IPP	independent power project
IRP	integrated resource planning
JI	joint implementation
kWh	kilowatt hour
M&V	measurement and verification
MDB	multilateral development bank
MW	megawatt
NGO	non-governmental organization
NPV	net present value
O&M	operations and maintenance
OECD	Organization for Economic Co-operation and Development
OPIC	Overseas Private Investment Corporation
RFP	request for proposal
T&D	transmission and distribution