VIII. TOOLS FOR FINANCING ENERGY EFFICIENCY

A. Introduction

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.

One resolution to this dilemma is to adopt an approach that considers market conditions, financing structures, and policies at the same time. Thus, this chapter:

- describes some of the key the market conditions and barriers that restrict making energy efficiency an attractive investment
- identifies financing structures that are applicable to energy efficiency investments
- recommends financing strategies for all stakeholders attempting to increase energy efficiency financing.

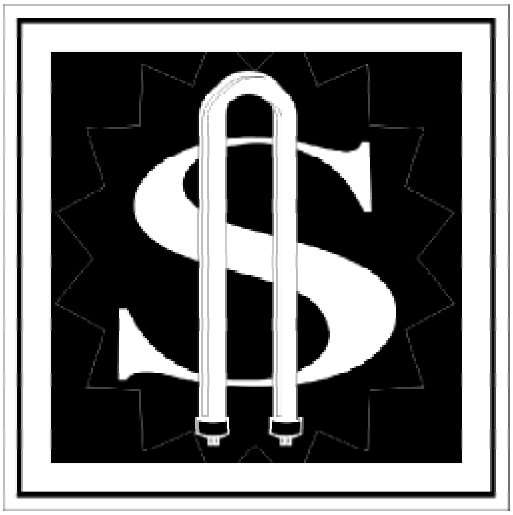

Figure 8.1: Financing energy efficiency projects often requires the energy champion to think of novel ways of finding investor.

There are generally two types of stakeholders interested in financing energy efficiency: 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 Chapter 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. Approach

To compile this chapter an extensive Internet based search of international public and private websites was carried out, publications and conference notes were reviewed (general government guidelines, journals, policy statements, technical notes, case studies, governmental acts and white papers) and some industry experts were interviewed. However, this Chapter is predominately a summary from two sources of information that were found to be the most comprehensive and accurate from all the research completed, as described below.

- A 77 page report for the United States Agency for International Development 1996 "Business Focus Series: Strategies for Financing Energy Efficiency", prepared for the USA Office of Energy Environment and Technology, by Hagler Bailly Consulting, Inc.
- The US Office of Energy Efficiency and Renewable Energy (EERE) web site that provides useful links to energy efficiency and renewable energy financing resources in the USA and overseas.

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 - favourable market conditions, motivated stakeholders, and compelling economics - is the best one for obtaining much-needed financing for energy efficiency projects.

The four types of market conditions which have the strongest influence on energy efficiency investments are discussed in the following sections:

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

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. Namely 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. The industry encompasses both end-use and supply-side applications. Distribution channels vary widely, both by product/service and by country. 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:

- a financing strategy that is applicable to a project of high value may have no application for the purchase of an inexpensive, individual technology
- 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. Low energy prices give rise to excessive demand for energy. By raising energy prices, the return on an energy efficiency investment rises proportionately.

Ownership, regulatory environment, and market competition are key determinants of the industry structure. In countries with limited power availability and that experience power shortages, energy efficiency may provide additional financial and economic benefits.

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.

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.

3. Motivated Stakeholders

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 centres), 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 Chapter, 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.

4. Compelling Economics

Energy efficiency investments must provide acceptable returns for those who are making the investment. The payback period is the measure most often used when evaluating the returns on energy efficiency projects as is net present value (NPV), internal rate of return (IRR) and annualized life cycle costs. 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.

5. Barriers to Energy Efficiency Investments

The fact that huge potentials for energy efficiency improvements exist but remain unused obviously indicates that there are barriers to the implementation of such measures.

The main barriers are the following:

- Pay-back period criterion
- Subsidized energy prices
- Capital availability, capital costs, uncertainty and risks
- Information, transaction costs and limitations in access to foreign currency
- Possible disruption of production and the related "transition costs"
- Unstable economy with high inflation and unstable exchange rates and taxation
- Lack of skilled personnel or energy managers
- "Invisibility" of the impacts of energy efficiency measures
- General aversion of perceived risks

B. Financing Options

1. 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:

1 Leasing
Leasing gives the lessee use of the project in return for regular payments to the lessor, who remains the legal owner. Leasing has proven to be particularly adaptable to energy efficiency projects.

2 Third Party Financing or Performance Contracting
Often a developer or company does not have both the technical and the financial means to implement a project. In this case, recourse to a third party, usually in the form of an Energy Service Company (ESCO), may be appropriate. The ESCO provides the means and skills to finance, install, operate and maintain a project, and is usually financed directly from the energy savings or the energy generated by it. Thus, no up-front capital is required by the developer.

3 Project Financing
Whereby bank loans are secured largely against future cash flows rather than just the physical assets of the project.

4 Personal Reserves
On-balance sheet, whereby the costs of the project are met from the cash reserves of an individual or a small company.

5 Joint Venture
Many smaller energy project developers do not have the reserves to finance projects using the on-balance sheet route, or the time and skills to set up a limited recourse project-financing package. In this case, co-development (joint venture) with a stronger partner able to raise the necessary finance (perhaps an electricity utility) may be suitable.

6 Funds
Occasionally, recourse to pension funds, ethical/"green" investment funds, local community/co-operative support etc. may be possible, although these schemes are not common and there will be an element of competition for the limited funds available.

7 Vendor Financing / Corporate Financing
The involvement of private investors who accept all the risk from a new project on their balance sheet may also be a possible financing route. Investors could include large corporates, investment banks and institutional investors etc.

8 Venture, Seed and Development Capital
Certain projects may be attractive to the venture, seed and development capital industry, although the nature of the return expected and the investment criteria used may not be suitable for energy efficiency projects.

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. Several examples of how local financial institutions are successfully acting as intermediaries for energy efficiency projects are described below.

India

In India, the Industrial Credit and Investment Corporation of India, Ltd. (ICICI) has been working with the Asian Development Bank (ADB) and the US 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.

Poland

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".

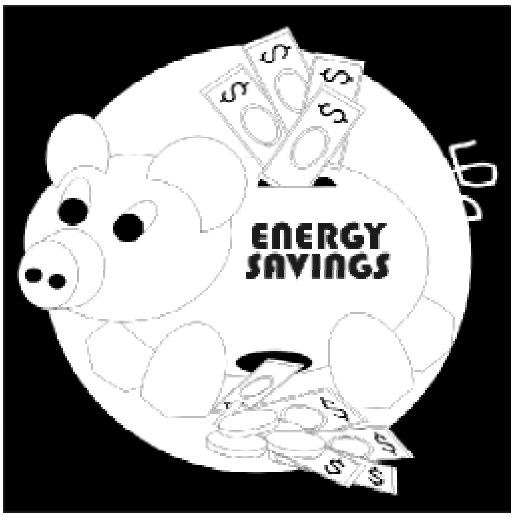

Figure 8.2: In Case Study 71, a revolving fund proved to be an effective strategy for promoting energy efficiency.

Hungary

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 Case Study 72.)

Thailand

In Thailand, the Energy Conservation Promotion Act (the Act) was approved by the Government of Thailand in March 1992 with mandates to promote energy conservation and energy conservation investment in factories and buildings. The Act is seen as innovative as it blends incentives with mandatory regulations to facilitate the implementation of mandated energy-efficiency measures.

National policies and programmes for the promotion of investments in energy efficiency in countries with economies in transition (EITs) like Kazakhstan, Kyrgyzstan and Tajikistan can be found at http://www.unescap.org/enrd/energy/finance.

In each of the examples mentioned, 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 payor 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.

2. Leasing

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 instalment 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. There are many advantages to leasing:

- the lessee's requirements for initial cash are minimal or none
- the lease may be structured so that cost savings will be greater than the lease payments, thus generating a positive cashflow for the lessee
- 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. 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. Third, lease financing represents a potentially large source of funding. Fourth, lease financing structures are being used successfully for energy efficiency in the US and existing models can be replicated or adapted to other countries.

Today, such companies as detailed below aggressively market lease-financing services for energy efficiency equipment. US energy efficiency companies often use leasing to sell their equipment and turnkey project services both in the US and internationally.

3. Third Party Financing

Third Party Financing (European term) or Performance Contracting (US term) is frequently employed in the financing of energy efficiency projects. It has been widely used in the US and Europe, but is relatively new in developing countries and emerging market economies. In Third Party Financing, 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 Third Party Financing 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 Third Party Financing for energy efficiency projects. Third Party Financing represents one of the ways to address several of the most frequently mentioned barriers to investment. Third Party Financing 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. Third Party Financing 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 Third Party Financing 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 US ESCOs operating overseas with joint venture partners. A description of one of EPS' projects using Third Party Financing in the Czech Republic is described in Case Study 39.

One hypothesis for why the success stories are few is the mismatch between the skill mix and resources of US ESCOs and the requirements of doing business in developing countries and emerging economies. Many US 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 Third Party Financing is not widespread outside of a few countries is that the fundamental concepts behind Third Party Financing are new and will take time to learn. In addition, most of the time, the contracts need to be adapted to conform with country's legal requirements.

The Role of Energy Service Companies

ESCOs have long been active participants in the US market for energy efficiency by acting as both project developers and marketers. However, US 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.

In some cases ESCOs provide financing for projects from their own funds; however, they are generally 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 US $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.

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. The guaranteed savings contract is the most popular type of performance-based agreement.

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 US 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 US have experience in this type of lending. Few banks outside of the US 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.

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.

An example of a creative approach to securing adequate non-recourse financing is described in the Case Study 73. below. A special $30 million fund was created, Proven Alternatives Capital Corporation and Banque Paribas were 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.

4. 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.

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.

The Vendor/Financier Agreement

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.

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 cashflow 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 cashflow 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.

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 Case Study 74.

Use of Trade Finance in Vendor Finance Programs

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.

5. 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. Table 8.1 shows the types of activities included in typical DSM programs.

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

Table 8.1: Typical DSM programs

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. 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 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.

The extent of a utility's motivation is often a function of its operating environment. 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. 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.

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. 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. 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.

The provision of energy efficiency/DSM or financial services may also constitute a new utility profit centre. 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. In the future, the utility may obtain benefits via pollution reductions or Joint Implementation greenhouse gas emissions credits.

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 below:

- **Facilitator**
  Acting to organise the market for stakeholders
- **Collection Agent**
  Method of aggregating capital demand and addressing credit risk
- **Financial Service Provider**
  The utility is a vehicle to access financing for its customers
- **Payor/Buyer**
  Direct payment (rebates) and credit support
  Organizer and informer of the energy end-user
  Billing and collection of finance payments
- **Project implementor**
  Procurer of efficient products and services
  Conductor of energy efficient procurements for customers
  Financial service provider
  Purchaser of efficiency resources
  Stimulating the interest of financial institutions
  Lowering transaction costs by pooling a number of energy efficiency projects

Utility Design Considerations for the Financing Program

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.

6. The Profitability of Energy Efficiency Upgrades

Application of the 10 energy efficiency measures described below in a typical home yields nearly US$600 in annual bill savings, and an impressive 16% overall return on investment. The diagram below provides a representative view of the high profitability of energy efficiency upgrades. Note that the home evaluated here is located in an average US climate and has a heat pump, electric water heater, clothes washer, clothes dryer, and dishwasher. By adjusting the figures below by using foreign exchange rate and domestic buying power and other domestic economic assumptions, one can make comparisons with developing countries.

Upgrade	Purchase Price	Annual Savings	SImple Payback	Rate of Return
Fluorescent Lamps & Fixtures	$200	$80	2.5 yrs	41%
Duct Sealing	$250	$95	2.6 yrs	41%
EnergyStar Clothes Washer	$194	$66	2.9 yrs	37%
EnergyStar Programmable Thermostat	$107	$29	3.7 yrs	30%
Water Heater Tank Wrap (R12)	$85	$23	3.7 yrs	28%
EnergyStar Refridgerator	$97	$23	4.2 yrs	27%
EnergyStar Heat Pump	$692	$126	5.5 yrs	19%
EnergyStar Dishwasher	$29	$5	5.5 yrs	18%
Air Sealing (0.5 changes / hour)	$522	$38	13.7 yrs	9%
Increase wall and roof insulation	$1784	$111	16.1 yrs	8%
Total	$3960	$597	6.6 yrs	16%
Total Bill Savings as % of Baseline Bill[1]				36%

Table 8.2: Potential energy savings for homes.

NOTES:
Assumes typical house with air-source heat pump, electric water heating, clothes washer, clothes dryer, dishwasher. Purchase prices and annual bill savings for efficiency measures are in nominal 1997 dollars. The rate of return assumes 3% annual inflation in residential electricity prices. After-tax rates of return assume a 28% marginal income tax rate.

[1]Purchase price of clothes washer, dishwasher, thermostat, and heat pump measures is incremental to the price of existing "NAECA" appliance standards. All other prices reflect the full cost of the measure, including installation.

[2] Bill savings assume average electricity cost of 8.8¢ per kilowatt-hour. Bill savings of equipment measures are relative to a NAECA standard unit.

[3] Heating and cooling consumption values are from LBNL energy modelling using DOE-2; other end-use consumptions are from the US Department of Energy's Residential Energy Consumption Survey (RECS).

The example cost-effectively surpasses the 30% savings target for existing homes under PATH (The Partnership for Advancing Technology in Housing). In fact, all of these measures yield a higher return on investment than an ordinary bank account, and most are as or even more profitable than the stock market has been in recent years! The efficiency savings shown above include the effect of income taxes. This makes the savings even more attractive, because you can keep all the money you save on your energy bills, but have to pay hefty taxes on most ordinary investment income.

7. Special Purpose Funds – Grants, Loans, 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 have been 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.

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 below can be used for energy efficiency:

- **Restricted Accounts**
  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.
- **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.

Application to Energy Efficiency

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. 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 Table 7 below. As this table indicates, nearly any stakeholder can be involved in the development, financing or administration of a special-purpose energy efficiency fund. Multilateral development banks, foreign assistance agencies such as USAID, and local government agencies have had the most experience with energy efficiency funds.

Multilateral Development Banks

Restricted accounts, line of credit, revolving fund, guaranty fund, small and medium-size enterprise funds

World Bank	http://www.worldbank.org
EBRD	http://www.ebrd.com/
ADB	http://www.adb.org/
Inter-American DB	http://www.iadb.org/
African DB	http://www.afdb.org/

Foreign Assistance Agencies

Guaranty fund, credit enhancement, seed capital for investment fund, grants, and subsidized loan funds

USAID	http://www.usaid.gov/
ODA	http://www.mofa.go.jp/policy/oda/
CIDA	http://www.acdi-cida.gc.ca/index.htm

Investment Finance Agencies

Investment fund, guaranty fund, insurance fund, all-energy regional funds

IFC	http://www.ifc.org/
IIC	http://iic.nic.in/
OPIC	http://www.opic.gov/
KFW	http://www.kfw.de/EN/inhalt.jsp

Export Credit Agencies

Lines of credits

USEXIM	http://www.exim.gov/
JEXIM	http://www.foejapan.org/en/aid/jbic01/jexim_cmt.html
EDC	http://www.edc.ca/
COFACE	http://www.coface.fr/anglais/indexe.htm
ECGD	http://www.ecgd.gov.uk/

Private Sector

Investment funds, grant funds, revolving funds

FoundationsInstitutional investorsIndividuals

Complete web source in the relevant country

Table 8.3: Likely foreign organizations / participants for energy efficiency funds and the type of fund.

Governments
Subsidized loan funds, grant fund, revolving loan funds, credit lines, restricted accounts
Environment agencies
Energy agencies
Municipalities
Development Banks
Complete web source in the relevant country

Utilities
Still early stages of development in developing countries
Electric utilities
District heating utilities
Water utilities
Complete web source in the relevant country

Private Sector
Leasing fund, lines of credit, revolving funds, investment funds.
Equipmentvendors
Commercial banks
Industry associations
Foundations
Complete web source in the relevant country

Table 8.4: Likely local organizations / participants for energy efficiency funds

Multilateral Financial Agencies
Since the 1992 UNCED Conference in Rio de Janeiro, lending for environmental purposes has gained a high priority. Today, all major multilateral agencies are incorporating environmental consideration in their programmes. Although the share of financial assistance from the institutions is not as big as bilateral aid or private sector investment, they can play a pivotal role in promoting international cooperation in the new emerging mechanism. Multilateral financing agreements can promote models for private sector cooperation in financing of energy efficiency investments.

World Bank
The World Bank has increased its share in energy efficiency financing, including Activities Implemented Jointly (AIJ) activities, co-financing operations with the Global Environmental Facility (GEF) and through encouraging client countries to improve energy efficiency under its "country-policy dialogue". The World Bank group also assists projects indirectly through the cooperation with relevant co-financers. As major implementation agency of the Global Environmental Facility, the World Bank has also mobilized private capital and bilateral cofinancing for the GEF funded renewable energy and energy efficiency projects.

During recent years, the World Bank has initiated new, innovative programmes for supporting energy efficiency projects. The objective of Prototype Carbon Fund (PCF) is to supply high quality carbon offsets to industrialized countries through investments in emissions reduction activities in developing countries and economies in transition at prices which are fair to both buyers and sellers.

Another activity of the World Bank is the Joint United Nations Development Programme (UNDP)/World Bank Energy Sector Management Assistance Programme (ESMAP) funded initiative *Energy Efficiency Operational Exchanges Programme*. This is not an activity related to financial activities but can be helpful for developing country hosts to share knowledge and practical lessons on energy efficiency issues.

The national strategies studies programme was launched in 1997 to assist potential host country governments of AIJ and JI in exploring the opportunities and potential benefits and in formulating their own positions.

With the need of an independent financial institution to fund mitigation and response strategies in eligible developing countries and countries in transition, UNFCCC designated the GEF as an interim financial mechanism with three agencies for implementation of projects: United Nations Development Programme, United Nations Environment Programme, the World Bank. From 1991 to mid-1999, GEF approved grants totaling US$706 million for 72 energy efficiency and renewable energy projects in 45 countries.

Asian Development Bank (ADB)

The Asian Development Bank (ADB) also has undertaken several trial projects in the area of climate change. Since 1995, ADB has been implementing the Asia Least Cost Greenhouse Gas Abatement Strategy (ALGAS) in 12 Asian countries with funding provided by UNDP. Until 1999, selected projects in 11 countries have been identified. The total budget of the project was about 10 million dollars, of which about 8 million dollars came from the GEF through UNDP.

Experience with Special Purpose Energy Efficiency Funds

There are several reasons why funds are useful to energy efficiency projects, but not all of them apply in every instance. Energy efficiency lending requires specialized skills and expertise that are not ordinarily possessed by many financial institutions. Special Purpose funds provide extra market development and project preparation assistance, as well as acting as a vehicle to finance smaller projects and a way to lower transaction costs by replicating and standardisation.

8. Future Financing Structures

The previous financing options described above have discussed financing mechanisms and sources of capital that are well tested, if not in the field of energy efficiency, then elsewhere. Looking forward, there are three concepts that are emerging as potential avenues to finance energy efficiency investments:

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. Linking energy efficiency financing to an IPP financing can act as a "catalyst" for further energy efficiency funding.

Financial Assistance under the United Nations Framework Convention on Climate Change

Financial assistance to developing countries has been one of main issues in the international debate during recent years. In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) agreed on the principle that international cooperation is needed to finance development needs. Since then Article 6 Activities Implemented Jointly/Joint Implementation (AIJ/JI): Article 12: Clean Development Mechanism (CDM) and Article 17 International Emission Trading (IET) have financing potential for developing countries. As detailed in the report commissioned by the United Nations Economic and Social Commission for the Asia and the Pacific "Promotion of Energy Efficiency in Industry and Financing of Investment" there are 143 AIJ projects which were implemented in 27 host countries and by 9 investor countries with a total of approximately 170 million tons (Mt) of emissions reduced at a total cost of approximately US$ 640 million. See http://www.unescap.org/enrd/energy/finance.

In particular, looking at the share of private sector funding in the figures below, it would appear that there is a surprisingly large participation of private investment (US$ 140 million), which compares to US$46 million of public investment in AIJ projects. In 2000, seven parties (Japan, Canada, Denmark, Iceland, Netherlands, Norway, Sweden, and USA) have actively supported the pilot phase of AIJ and most of the private funding was from US investors. Schwarze (2000) considered the active participation of US private sector as a result of the US Initiative on Joint Implementation.

Tapping Secondary Financial Markets for Energy Efficiency Financing

Accessing secondary financial markets for energy efficiency financing is beginning to occur in the United States, and could be a mechanism for financing energy efficiency in other countries. The US 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:

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

C. Conclusions and Recommendations

1. Financing Strategies

While most of the strategies are specifically for financing, policy recommendations and a market strategy are also included 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.

Funding Strategies

1 ***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. 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.

2 ***Increase the Participation of Commercial Credit Providers.*** These traditional providers of credit are a large and nearly un-utilized 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.

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.

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, development, implementation and 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.

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.

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.

7 ***Develop Innovative Financing Mechanisms for the Future.*** 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 Chapter: 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.

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.

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.

10 ***Increase Market Penetration of Energy Efficiency Goods and Services.*** 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. 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.

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. Bilateral donor agencies should 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 favourable 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, all types of financial institutions - commercial banks, export credit agencies, international financing agencies, and leasing companies should learn about energy efficiency investments and be encouraged to become active participants in the market.

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Companies offering their own vendor finance
General Motors Acceptance Corporation. http://www.gmacfs.com/

Caterpillar Credit Corporation. http://www.caterpillar.com/

Lease-Financing Service Companies
GE Capital. http://www.ge.com/

Honeywell.http://www.honeywell.com

CIT Financial. http://www.cit.com/

BankOne. http://www.bankone.com/

Citicorp. http://www.citibank.com/

Energy Efficiency Funds
Korea - KEMCO. http://www.kemco.or.kr/english/index.html

United States - Proven Alternatives/Bank Paribas
http://www.weea.org/worldwide/reports/html/053/ Chapter4.htm

Hungary - Magyar Hitel Bank. http://www.mkb.hu/english/

Philippines -TTEM http://www.gtz.de/em-home/phil/emphil2.htm

India - Industrial Development Bank of India. http:// www.idbi.com/

Pakistan - ENERCONhttp://www.peemac.sdnpk.org