

# **IMPROVING ENERGY EFFICIENCY IN INDUSTRY IN ASIA**

**- A Review of Financial Mechanisms  
(DRAFT)**



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# **IMPROVING ENERGY EFFICIENCY IN INDUSTRY IN ASIA**

**A review of financial mechanisms as part of the  
*Energy Efficiency Guide for Industry in Asia***

**[www.energyefficiencyasia.org](http://www.energyefficiencyasia.org)**

**United Nations Environment Programme  
Division of Technology, Industry and Economics**

**June 2006**

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# 1. EXECUTIVE SUMMARY AND CONCLUSIONS

This report was prepared as part of UNEP's *Energy Efficiency Guide for Industry in Asia* to provide companies in nine Asian countries<sup>1</sup> with information on available mechanisms to help them finance energy efficiency projects and also to provide policy makers with information about the types of mechanisms that they could consider introducing in their own countries to facilitate increased energy efficiency investment.

The mechanisms reviewed included tax incentives, subsidies, loan programs, and Energy Service Company (ESCO) performance contracts. An attempt was made to identify as many applicable mechanisms in the nine countries as possible. However, it is not an exhaustive survey of all mechanisms in all countries.

## 1.1 Conclusions

The main findings of this review include:

***Conclusion 1. Mechanisms specifically designed to support financing of energy efficiency investments in Asia are limited.***

- The most commonly available mechanism is Energy Service Companies (ESCOs), with active ESCOs identified in seven of the nine countries. While these ESCOs reportedly offer performance contracts, in practice significant barriers remain that prevent performance contracting from becoming a widespread and sustainable practice.
- The second most common mechanism is loan funds, with six funds available in five of the nine countries. Of these funds, five are currently supported through donor funding.
- Most mechanisms rely heavily on donor support. Only Thailand has programs that are supported primarily through government revenues, raised in a tax on petroleum fuels. In many of the nine countries, the financial sector continues to require both technical and financial support for the financing of energy efficiency projects.

***Conclusion 2. Private sector financing of energy efficiency investments can be viable and profitable.***

- Thailand's experience suggests that with the right interventions and an adequate level of financial sector development, private sector financing of energy efficiency projects is possible in Asia.
- There is significant interest in developing and financing projects through performance contracts (an alternative to bank loan financing provided through ESCOs), but financial sector barriers continue to restrict growth in this area.

***Conclusion 3. Availability of private sector financing will not be sufficient to encourage energy efficiency investments in all cases.***

- Some businesses – particularly small and medium size enterprises (SMEs) simply will not have the financial strength necessary to qualify for traditional loan financing, even with subsidized interest rates or guarantee funds.
- Some businesses will not choose to make energy efficiency investments, even if financing is available. Consequently, other policy options may need to be considered to promote energy efficiency among these businesses.

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<sup>1</sup> Countries that participated in the UNEP project, "Greenhouse Gas Emission Reduction from Industry in Asia and the Pacific (GERIAP): Bangladesh, China, India, Indonesia, Mongolia, Philippines, Sri Lanka, Thailand, and Vietnam.

***Conclusion 4. Financial mechanisms should not be viewed in isolation from other programs to promote energy efficiency.***

- Improving the availability of financial mechanisms for energy efficiency projects will not increase investment unless industry wants to invest. Programs to ensure adequate demand for energy efficiency financing may therefore be necessary before programs supporting financing mechanisms can be undertaken.
- Financial mechanisms aim to address different barriers to financing. Consequently, it is important to understand the specific barriers to financing in a given country first, before planning programs to improve financing availability.
- Some policies common in Asia can discourage investment – e.g., subsidized energy prices prevent proper valuation of energy costs and efficiency savings, and therefore discourage the implementation of energy efficiency projects.

## **1.2 Recommendations**

For financing for energy efficiency projects to be sustainable, several conditions must be met:

- Government policy should encourage (and certainly not discourage) efficiency improvements.
- Industry must have the technical know how and management systems to plan energy efficiency projects and evaluate their potential business benefits.
- The financial sector must be well developed and understand the potential for profit in energy efficiency projects and businesses.

Achieving these conditions requires action, not just from policy makers, but also from industry and the financial sector.

### **1.2.1 Recommendations to Policy Makers**

As discussed in Conclusion 2, effective programs to promote energy efficiency financing can only be developed as part of an integrated policy approach that addresses barriers in industry and the financial sector, and which reflects an understanding of the specific conditions at work in the countries where the programs are being implemented. A critical first step is an evaluation of current conditions to identify places where policy interventions can be most useful. Table 1 on the following page summarizes a range of recommendations for policy makers might choose, depending on the results of a thorough evaluation. A discussion of the range of legislative, economic, and voluntary instruments that policy makers also need to consider is provided in *Improving Energy Efficiency in Industry in Asia – a Policy Review*, available at [www.energyefficiencyasia.org](http://www.energyefficiencyasia.org).

### **1.2.2 Recommendations to the Industrial and Financial Sectors**

Industry and the financial sector also have important roles to play in developing sustainable financing:

- Industry should build the technical capabilities to develop the feasibility studies that will be required to obtain private sector financing.
- Industry should have the kinds of financial and management systems in place to accurately appraise the potential cost savings associated with energy efficiency investment opportunities, qualify for financing, and support the implementation of ESCO performance contracts.
- The financial sector should recognize the opportunities available and work to develop the products and programs that will be needed to respond to growing demand from industry for energy efficiency programs.

**TABLE 1. SUMMARY OF RECOMMENDATIONS POLICY MAKERS**

<b>Energy Efficiency Policy</b>	<b>Industry Programs</b>	<b>Financial Sector Programs</b>
<ul style="list-style-type: none"> <li>• Eliminate energy subsidies. Subsidies discourage energy efficiency investment by causing undervaluation of the cost savings associated with reduced energy use.</li> <li>• Use fiscal policy (taxes and tax incentives) and other demand building financial mechanisms (e.g., non-tax subsidies) to encourage energy efficiency.</li> <li>• Use fiscal policy to encourage equity investment in energy efficiency ventures, such as ESCOs.</li> <li>• Use revenue from fuel taxes to fund energy efficiency programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide information to industry on the business benefits of energy efficiency.</li> <li>• Build capacity among energy users to evaluate energy use and potential savings. Provide tools to assist evaluations.</li> <li>• Where industry is state-owned, ensure that managers are rewarded for production cost reductions.</li> <li>• Assist industry in improving accounting and other management systems.</li> <li>• Require large users to evaluate energy use and identify opportunities for greater efficiency. Reward compliance with assistance in implementing efficiency projects.</li> <li>• Provide technical assistance to build industry capacity to develop applications for financing for their projects.</li> <li>• Develop alternatives to facilitate energy efficiency investment for businesses that may not qualify for traditional loan financing.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide technical assistance to the financial sector to address gaps in knowledge concerning energy efficiency lending and financing of innovative ventures, such as ESCOs.</li> <li>• Provide incentives, e.g., by providing dedicated loan funds, for example, to the financial sector to encourage them to make energy efficiency loans.</li> <li>• Subsidize guarantee funds where primary financial sector concerns are risk, or where industry is unable to provide sufficient collateral for loans.</li> <li>• Build awareness/capacity among equity investors to increase investment in energy efficiency ventures (ESCOs)</li> </ul>

## 2. INTRODUCTION

### 2.1 Importance of energy efficiency in industry

Energy demand is growing significantly in most Asian countries due to rapid industrialization. Indeed, the five most energy intensive industrial sub-sectors – iron and steel, petroleum refining, cement production, pulp and paper and chemicals – account for approximately 45 percent of all industrial energy consumption in the region.<sup>2</sup> As a result, the industrial sector is one of the major contributors to greenhouse gas (GHG) emissions, and this will likely continue as Asia's energy use and related CO<sub>2</sub> emissions rise by an estimated 50+ per cent by the year 2030.<sup>3</sup> Unfortunately, however, large amounts of energy consumed by industry in Asia are used inefficiently because of lack of awareness about proper energy management and weak energy policies and measures. In fact, studies indicate that as much as 23 percent of industrial end-use energy is wasted as the result of inefficiencies.<sup>4</sup> Finding ways to increase energy efficiency in the industrial sector in Asia is therefore critical because the global climate and the region's energy security depend on it. A key tool to achieving this goal is to ensure that funding exists to pay for industrial investment in energy efficiency. Such mechanisms are reviewed in this report.

### 2.2 Background to this review

The project “Greenhouse Gas Emission Reduction from Industry in Asia and the Pacific” (GERIAP), funded by the Swedish International Development Cooperation Agency (SIDA) and coordinated by the United Nations Environment Program (UNEP), began in 2003 and ended in June 2006. The objective of the project was to support Asian businesses to address climate change by becoming more energy efficient, and thereby reducing greenhouse gas emissions and costs. The primary target group is Asian industry (specifically five sectors: cement, steel, pulp/paper, chemical and ceramics in nine countries: Bangladesh, China, India, Indonesia, Mongolia, Philippines, Sri Lanka, Thailand, and Vietnam). A secondary target is all other stakeholders who can influence industry (government, associations, customers, NGOs, research institutions, banks etc.). The project had three components:

- Capacity building: National Focal Points (NFPs) and participating companies received training on how to apply cleaner production (CP) concepts to identify energy efficiency options for main energy uses in industry.
- Demonstration of CP and energy efficiency: CP assessments to find ways to improve energy efficiency were carried out at the participating companies. Options that were technically feasible, financially attractive and reduced energy and GHG emissions were implemented, resulting in sector specific case studies.
- Survey of barriers to energy efficiency: Why do some companies improve energy efficiency and others not? A survey assessed the financial, technical, cultural and other factors affecting businesses, resulting in proposed solutions to overcome the most important regional and national barriers in Asia.

The main output of the project is the “Energy Efficiency Guide for Industry in Asia” (the Guide) with the results from the three project components, including energy information and options for energy equipment and industrial processes. The Guide has been partly translated into nine languages: Chinese, Vietnamese, Thai, Bahasa Indonesia, Sinhala, Bangla, Mongolian and Tamil.

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<sup>2</sup> UNESCAP, *Promotion of Energy Efficiency in Industry and Financing of Investments*, 2001, p. 5

<sup>3</sup> UNEP, International launch showcases Guide for Asian industry to reduce energy costs and greenhouse gas emissions, Press release, January 18th 2006.

<sup>4</sup> UNESCAP, *End-use energy efficiency and promotion of a sustainable energy future*, 2004, p. 55.

## 2.3 Objective, Scope and Output

While the Guide provides information and tools for industry to help identify appropriate technologies and improvements that will increase the efficiency of their energy use, a major hurdle to implementing changes, once identified, is finding a way to pay for them. For this reason, it was believed that a review of financial mechanisms and economic incentives programs available to industry would be useful. It was hoped that such a review would directly help industry locate financing and incentives programs that would be useful to them, but also that the review might provide models that other Asian countries could adapt for use in their own countries.

The objective of this research study is to review the financial and economic mechanisms available to help pay for energy efficiency improvements or that provide financial incentives to implement such improvements. The scope of the review is limited to:

- Mechanisms and instruments related to energy efficiency improvements in industry.
- Asian countries, particularly GERIAP countries (Bangladesh, China, India, Indonesia, Mongolia, Philippines, Sri Lanka, Thailand, and Vietnam), although some examples used to illustrate mechanisms come from outside the region.

The output of the study is this report, which reviews financial and economic mechanisms to provide incentives or help finance energy efficiency improvements. The report first describes each instrument, including providing an analysis of the relative strengths and weaknesses of the instrument, as well as barriers to the use of the instrument by industry. The report then presents a survey of mechanisms available in GERIAP countries, with a description of programs and an overview table summarizing available programs and contact information.

## 2.4 Methodology

This review was conducted in May to June 2006, and included the following steps:

### **Step 1 ~ Information gathering**

Information was gathered from a wide range of sources, including existing reports on financial and economic mechanisms for energy efficiency, evaluations of existing incentives and financial assistance programs throughout the world, websites with information on specific country financing and incentives programs and policies, and email and telephone contact with key individuals in Asia. The key documents, websites, research reports, and contacts used in this review can be found in the reference section of this report.

### **Step 2 ~ Detailed analysis**

Material collected as part of Step 1 was synthesized and analyzed in preparation for the drafting of the report in Step 3.

### **Step 3 ~ Preparation and dissemination of report**

The report was drafted and disseminated through the Guide's website at:  
[www.energyefficiencyasia.org](http://www.energyefficiencyasia.org).

### 3. FINANCIAL MECHANISMS TO FACILITATE ENERGY EFFICIENCY INVESTMENTS

There are a wide range of financial and economic mechanisms or instruments that may be implemented to facilitate investment in energy efficiency projects as listed in Table 2. These mechanisms have an impact on investment decisions or on an entity's ability to invest by helping to reduce the overall costs of the energy efficiency investment (easing the decision to invest) or by facilitating financing of the investment (reducing barriers to and costs of commercial financing).

**TABLE 2. TYPES OF FINANCIAL MECHANISMS**

Tax policy	<ul style="list-style-type: none"> <li>• Taxes</li> <li>• Tax incentives</li> </ul>
Tax policy	<ul style="list-style-type: none"> <li>• Taxes</li> <li>• Tax incentives</li> </ul>
Subsidies	<ul style="list-style-type: none"> <li>• Subsidies</li> </ul>
Lending programs	<ul style="list-style-type: none"> <li>• Bank loans</li> <li>• Soft loans / revolving funds</li> <li>• Guarantee funds</li> <li>• Energy efficiency "Bank windows"</li> </ul>
ESCOs	<ul style="list-style-type: none"> <li>• Guaranteed savings</li> <li>• Shared savings</li> <li>• Pay from savings</li> <li>• Other</li> </ul>

This section will provide a description of the financial and economic mechanisms most commonly in use to support energy efficiency investments, discuss the advantages and disadvantages of each of the mechanisms, highlight specific barriers to their use and discuss the circumstances under which the different mechanisms might best be used.

#### 3.1 Tax Policy

Government fiscal policy, namely taxes and tax incentives, can help generate demand for energy efficiency improvements. This section describes role of taxes and tax incentives in facilitating investment in energy efficiency and discusses likely industrial response to taxes and incentives.

##### 3.1.1 Taxes

The primary role of taxation is to raise government revenue. A secondary, but not insignificant, role of taxation can be to discourage behaviors in order to promote societal values (e.g., taxation of cigarettes that reduces smoking), as well as to help correct market imperfections (e.g., taxation of toxic emissions) by forcing better internalization of the costs of particular behaviors.

Taxes on the consumption of fuels (e.g., petroleum or gasoline) or taxes on the harmful by-products of using certain types of fuels (e.g., emissions from coal fired power plants) raise the cost of consumption of those fuels and help internalize the environmental costs associated with that consumption. The result is:

- A decline in the demand for the product being taxed.
- Increased revenue for the state.
- Decreased pollution impact from use of the product and reduced incidence of detrimental health impacts.

Taxes are effective in promoting energy efficiency in cases where:

- The level of taxation is sufficiently high to induce the desired change.<sup>5</sup> If the level of tax is set too low, then energy users will simply pay the tax without changing their consumption patterns.
- Demand, either for the energy source being taxed or the products made using that energy source, is sufficiently elastic that increased prices will affect purchasing behavior. If energy costs cannot be passed on to buyers of a product, industry will have a strong incentive to reduce energy costs to stay competitive.

At the same time, there are disadvantages to the use of taxation as a means to promote improved energy efficiency:

- Taxes, particularly on fuel, can have a disproportionate impact on vulnerable populations, such as the poor.
- The threat of higher taxes can generate public opposition, which may ultimately hinder efforts to encourage greater energy efficiency.
- If the level of tax is too high, energy users may be encouraged to evade the tax.
- If the demand for the goods produced by a given industry is inelastic, industry will easily be able to pass along increased energy costs in increased product costs. Consumers will simply pay the additional cost and industry will not reduce its energy use.
- Taxation is a relatively indirect means to induce greater investment in energy efficiency improvements. Higher energy prices may reduce consumption, but may not have sufficient impact to induce efficiency investments by industry, particularly if the cost of changes needed to achieve greater efficiency is greater than the cost increase imposed through taxation.

#### A Special Role for Taxation

One area where energy taxes can play an important role in promoting energy efficiency is related to the primary goal of taxation – raising government revenue. Energy taxes can be used to raise revenue to fund government programs more directly aimed at promoting energy efficiency. If the proceeds of the tax are channeled to government programs designed to encourage greater energy efficiency, then the tax will serve the dual purpose of encouraging reduced energy consumption while at the same time promoting energy efficiency investments. (See discussion of Thailand's ENCON Fund, Section 4.8)

### **3.1.2 Tax Incentives**

Tax incentives (or tax relief) use the reward of reduced taxes to encourage desired behavior. Tax incentives tied to energy efficiency investments essentially reduce the cost of the energy efficiency improvement, which will serve to encourage more businesses to make that investment (thereby increasing demand for energy efficiency projects). Tax incentives are, therefore, a type of subsidy (subsidies are more generally discussed in Section 3.2 below), representing a transfer of wealth from one group (society at large) to another group (investors in energy efficiency). To facilitate implementation, tax incentives for energy efficiency investments are typically tied to specific equipment purchases – e.g., a list of equipment identified in advance by the government providing the subsidy. Sometimes, subsidies are tied to investment in equipment that meets a defined set of parameters. Such programs are more complicated to implement, since independent evaluations of whether a particular piece of equipment meets the criteria are necessary to monitor compliance with the program.

There are a number of ways in which tax incentives can promote investment in energy efficiency:

**a) Accelerated depreciation.** These types of incentives allow businesses to more rapidly depreciate the costs of their investments in energy efficiency technologies. The effect of more rapid depreciation is to reduce a business's taxable income as compared with use of normal depreciation during the depreciable life of the equipment purchased. The reduced tax burden effectively reduces

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<sup>5</sup> LBNL, pp. 3-5.

the cost of the equipment, making it a more attractive investment option.

**b) Tax deductions.** Under this type of incentive, businesses are allowed to deduct some or all of the cost of investment in energy efficiency technologies from their annual profits. The savings accrued to the business is equivalent to the amount of tax the company would have paid on the amount of the deduction. If a company pays 30 percent corporate income taxes, for example, then the savings generated by allowing a deduction of the full cost of energy efficient equipment would be 30 percent of the cost of the equipment.

**c) Tax credits.** Tax credit systems allow a business to reduce its total tax liability by some or all of the cost of an investment in energy efficiency. Tax credits typically generate more savings to business than tax deductions or accelerated depreciation, since they represent an absolute reduction in the amount of taxes paid, while tax deductions and accelerated depreciation only reduce the amount of taxable profit and therefore reduce taxes only by a percentage of the cost of the investment. In addition, the savings associated with a tax credit are more directly tied to the energy efficiency investment.

**d) Tax reductions.** Under a tax reduction incentive, taxes on paid on the purchase of energy efficiency equipment, such as VAT or import duties, are reduced. In developing countries, reduction of import duties can be significant, as domestic sources of energy efficiency technology may be limited, and standard duties on imported equipment may be a substantial barrier to their use.

There are advantages to the use of tax incentives, particularly relative to taxation, for promoting investments in energy efficiency. These include:

- Tax incentives are more likely to be effective than taxes on fuel or power use, if the goal is to promote investments in energy efficiency equipment and technologies. The benefits of the tax incentive are directly linked to the investment.<sup>6</sup>
- Compared with other types of subsidies, tax incentives may also be preferable because they are typically easier to implement (see Section 3.2).<sup>7</sup>

While useful tools, tax incentives have certain disadvantages instruments to promote more efficient use of energy:

- Tax incentives may not be the *most effective* way to actually reduce energy use or promote energy efficiency. Typical tax incentive programs are tied to the cost of the equipment purchased rather than to the efficiency performance of that equipment. Tax incentives could be made more effective in this regard if there was a performance incentive built in as well.<sup>8</sup> Such a program, however, would be more complicated to implement.
- Tax incentives are subject to the problem of the “free rider.” Some companies may get the benefit of a tax reduction for energy efficiency investments that they would have made in any case, even without the tax incentive. While it is difficult to quantify the impact of the “free rider,” one study of a Dutch incentives program concluded that nearly half of the firms taking advantage of the program would have made the investment in absence of the incentive.<sup>9</sup> Free rider problems associated with tax incentives can be minimized in a carefully crafted program. Tax incentives should be provided only for technologies that lack current profitability, but that a government wants to promote – e.g. technology that is relatively new and innovative, but that offers significant efficiencies over more established technologies.<sup>10</sup>

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<sup>6</sup> LBNL, p. 26

<sup>7</sup> Goldstein, p. 51

<sup>8</sup> Goldstein, p. 18

<sup>9</sup> LBNL, pp. 23-4.

<sup>10</sup> LBNL, p.27

- Tax incentives can require a large expenditure of public funds. Substantial effort may be required to establish a list of eligible technologies and equipment, particularly if this is being done to reduce “free riders.” Also, any tax savings to business represents reduced tax revenue to the government.
- Some may attempt to “game” the system. For example, contractors may raise technology costs in order to increase tax credits for their customers.<sup>11</sup>
- The effectiveness of tax incentives is tied directly to the effectiveness of a tax system itself. Tax incentives work because they reduce taxes, and businesses want their taxes reduced. However, in cases where tax evasion is easy and tax collection rates are low, tax incentives lose their effectiveness. Tax incentives are also less effective where economies are in recession or transition.<sup>12</sup>

### 3.2 Non-Tax Subsidies

An energy efficiency subsidy can be broadly defined as “public funds given directly to the party implementing an energy efficiency project.”<sup>13</sup> As discussed above, tax incentives are a particular type of subsidy, since reductions in taxes represent a transfer of public funds (in the form of lost government revenue) to the person or entity receiving the tax benefit. Non-tax subsidies (also referred to as “grants”) are a more direct means of making that transfer of funds and can be provided to businesses that invest in energy efficiency improvements in a variety of ways:

- As a fixed payment for an eligible investment.
- As a percentage of the total value of the investment (usually capped at some level).
- As an amount linked to the amount saved in energy or energy costs (a performance-based approach, as discussed above).

#### **Energy Subsidies and Energy Efficiency Investment**

In many developing countries in Asia, government subsidies have been used to reduce the cost of energy. This was often done (and continues to be done) to improve industrial competitiveness or to reduce energy cost burdens to household consumers. The effect of subsidized energy prices is to encourage more energy consumption than might otherwise have been the case. In addition, lower than market energy prices discourage investments in energy efficiency, by reducing the value of the cost savings associated with those investments. Ironically, many countries maintain energy subsidies at the same time that they are implementing programs to encourage investments in energy efficiency.

Some subsidy programs target equipment producers to encourage further energy efficiency research and development. Other subsidy programs will target a specific industry group, such as small and medium-sized enterprises (SMEs) that may have relatively greater difficulty in making investments than other industry groups. Like tax incentives, non-tax subsidies are typically limited to specific equipment or technologies – usually innovative technologies that may represent a riskier investment decision or equipment with long payback periods, but with large efficiency potential.<sup>14</sup> Also like tax incentives, non-tax subsidies reduce the cost of equipment, thereby encouraging a business to make energy efficient improvements or purchase a piece of equipment that is more expensive, but more energy efficient, than an alternative.

There are a number of situations in which subsidies can be an effective means to encourage investment in energy efficiency technology:

<sup>11</sup> Goldstein, p. 17

<sup>12</sup> Goldstein, p. 51

<sup>13</sup> LBNL, p. 15

<sup>14</sup> LBNL. Pp. 15-6

- In developing countries, where investment risk is typically higher than in developed countries. Direct funding can be more effective in generating investments in these environments than more indirect tax incentives.
- Where energy efficiency projects are too small to get attention from commercial banks (barriers to bank financing are discussed in greater detail in Section 3.3 below).
- Where non-asset based energy-efficiency projects are considered by commercial banks to be more risky, and therefore poorer loan risks, than asset-based projects (again, see Section 3.3, below).
- In countries where energy prices are subsidized and therefore do not reflect the real costs of energy (see text box, page 12) or are too low, even if at market levels, to make energy efficiency projects profitable.
- Where there are target audiences – e.g., SMEs or specific industry sectors – that face particular difficulty in obtaining financing for projects.<sup>15</sup>

Potentially effective, subsidy programs also have disadvantages that should be considered before they are implemented:

- Similar to tax incentive programs, non-tax subsidies are subject to the problem of free riders. The free rider problem can be minimized in the same manner – by strictly defining the types of investments that qualify for the subsidy.
- Lack of knowledge on the part of the target audience may prevent use of the subsidy. Outreach programs may therefore be necessary to maximize the effectiveness of these programs.
- High transactions costs, in the form of significant paperwork or other application processes, can also discourage subsidy use. Streamlined application processes, if possible, should be employed.
- Subsidy programs can be costly to operate. Governments must set up and operate the program, and subsidy payments high enough to induce investment may constitute a substantial transfer of public funds to the private sector.<sup>16</sup>

### 3.3 Lending Programs

Once the decision has been made by a business to implement an energy efficiency improvement project, it will generally be necessary to obtain outside funds to cover the investment, for all but the lowest cost alternatives. Traditionally, businesses use bank financing to fund a range of funding needs, from covering working capital requirements to major investments in expansions or acquisitions. This section discusses bank loans and barriers to their use, along with several approaches for overcoming them.

#### 3.3.1 Traditional Bank Loans

Businesses needing to make a substantial

<sup>15</sup> LBNL, p. 15

<sup>16</sup> LBNL, p. 15

#### Company-Based Barriers to Investment

Financing mechanisms for energy efficiency projects assume that companies have decided to make these types of investments. However, even where a potential energy efficiency investment is cost effective, a company still may not choose to make the investment.

Companies typically have limited funds for capital investment and established rules for selecting priority investments, based on evaluating internal rates of return (IRR) or payback periods, and comparing them to other investment options. If the IRR is lower or payback period longer relative to other options, the energy efficiency investment will not be selected. In addition, companies, like banks, often tend to favor investments that increase production over those that reduce costs. In some cases, a more sophisticated approach to estimating the returns from an energy efficient investment may be needed in order for an appropriate priority to be assigned to these projects. For example, implementation of better accounting systems might help improve evaluation of potential energy efficiency investments. Also, training for managers on the value of reducing production costs could be helpful.

*From: UNEP, Promoting CP Investments, p. 6*

investment, for example in a plant expansion, will typically approach a bank for a loan covering that investment. In determining whether to grant a particular loan, banks will consider a number of issues including:

- The credit history of the applicant, including whether the applicant has a history with the particular bank involved.
- The applicant's current financial strength.
- Whether the applicant has sufficient assets to pledge as collateral for the loan.
- The likely impact of the investment on the applicant's profitability.
- Any risks associated with the investment that could affect the ability of the applicant to repay the loan.

## **Barriers to Use of Bank Loans**

In theory, businesses should be able to obtain bank loans for investments in energy efficiency projects. There are, however, substantial barriers to obtaining financing for energy efficiency projects, especially in developing countries and particularly for SMEs. These barriers include:

- Banks lack understanding of the value of energy efficiency projects. Bankers often lack the technical knowledge necessary to adequately value the contribution that an energy efficiency project can make to the profitability of a loan applicant. As a consequence, loan applications for energy efficiency projects may receive unfavorable reviews by bank officers.
- Banks tend to favor investments focused on expanding production. Related to their lack of knowledge about the value of energy efficiency projects, many banks simply favor investments aimed at increasing the production of a company. The role of reduced production costs generally (including reduced energy costs) in business performance is poorly understood.
- Energy efficiency projects are considered "high risk." Energy efficiency projects often involve the use of innovative technology. Bankers are reluctant to make loans for technology that they consider untested or less likely to produce predicted cost savings and associated productivity gains, since this represents a higher risk option to banks than loaning funds for other purposes.
- Energy efficiency projects can have long payback periods. Banks are uneasy about lending for projects with lengthy payback periods, as this increases default risks.
- Collateral requirements. Energy efficiency projects are often not "asset-based;" i.e., they do not involve traditional assets, such as land or buildings, that the bank could take possession of, in the event that loan applicant fails to repay the loan. Consequently, the bank may decline to fund the project. Even where a bank is interested in making a loan for an energy efficiency project, alternative collateral requirements (commitment of land or structures as security) may be prohibitively high, especially for SMEs.
- Energy efficiency projects are too small. Many energy efficiency projects are simply too small to get attention from banks, which prefer making larger loans. Transactions costs, as a percentage of the loan amount, are significantly smaller for larger loans.
- Loans for energy efficiency projects have higher transactions costs than other loans. Because they are often for new or unusual technology or techniques, loan applications for energy efficiency projects require greater scrutiny and specialized attention from loan evaluators relative to more traditional loan applications covering factory expansions, acquisitions, and so forth. This makes the transactions costs associated with these loans even higher than for other similar-sized loans.

- Banks lack trust in consultant information included in loan applications. Banks may lack confidence that the technical information that is included in support of the application, particularly regarding the performance of innovative technology, is accurate and unbiased. This adds to banks' conclusions that energy efficiency loans are too high risk, since the bank would need to base its lending decision, in part, on technical conclusions that the bank may not trust.
- Businesses lack the capability to develop strong loan applications. Loan applicants themselves – especially SMEs – may lack the capacity to put together a loan application that will satisfy the bank.
- Banks often prefer to loan to applicants with whom they already have established banking relationships. Loan applications from businesses with a “track record” at a bank represent lower risks for the bank. Also, banks may be more willing to make small loans to existing customers, as this is seen as part of a larger package of services being provided to that customer.<sup>17</sup>

### 3.3.2 Programs to Address Barriers

Given the substantial barriers to traditional bank financing of energy efficiency investments, a number of programs have been developed that seek to address some, or all, of the barriers. Many of these programs are intended to provide subsidies and other support to the banking industry to allow it to develop the capacity necessary to offer energy efficiency loans on their own. This section discusses several of these approaches: “soft loans,” guarantee funds, and energy efficiency “bank windows.”

#### a) Soft Loans and Revolving Funds

“**Soft**” or **public loans** use public funds to offer loans at interest rates that are usually below the market rates for energy efficiency investment loans. A soft loan, because it is supported by public funds, is a subsidy of the costs of a bank loan for energy efficiency projects. By reducing the costs of borrowing, soft loans seek to encourage investments in energy efficiency that might otherwise not be implemented due to high financing costs. Often more complicated to set up than a traditional subsidy, however, soft loan programs are generally less broadly used.<sup>18</sup>

Soft loans are often associated with “**revolving funds**” where repaid loan funds are cycled back into the fund for relending for a new project. Money in the revolving fund is fully dedicated to energy efficiency lending (in some cases, revolving funds lend for a variety of environmental projects, including energy efficiency projects). Revolving funds are typically publicly supported, through subsidized interest rates or through partial or full public funding of the principal investment; monies for the fund may come from dedicated taxes on energy sources (e.g., fuel taxes, utility surcharges; see Section 3.1.1, above). Operation of the fund itself may be set up in cooperation with commercial banks. Such an arrangement allows evaluation of loan applications, monitoring of loans, and collection of loan payments to be managed by commercial banks that have existing expertise in these areas. Government offices, as a consequence, do not need to become bankers to administer the fund.

The public funding involved makes loan money available for energy efficiency projects that is currently not available strictly through the private sector. Thus, energy efficiency projects seeking funding through the revolving loan fund do not need to compete against more traditional investments for bank funding. Finally, the public funds provided to commercial banks are usually provided at zero or well below market interest rates. This enables the banks in turn to provide loans for energy efficiency projects at rates below market. In return for receiving public funds, banks can be asked to assume some or all of the risk of repayment associated with the loans.

These types of loan funds offer a number of advantages:

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<sup>17</sup> UNEP, Promoting CP Investments, p. 4

<sup>18</sup> LBNL, p. 21

- Involving the commercial banking industry uses existing financial institutions and expertise and keeps governments out of the banking business.
- Establishing the fund solves the problem of lack of bank interest in making energy efficiency loans by providing dedicated public funds. Involving banks in fund administration introduces them to energy efficiency lending and familiarizes them with these types of projects.
- Lower than market interest rates make energy efficiency investments more attractive to potential loan applicants.

Revolving funds address many of the problems and barriers associated with bank financing for energy efficiency projects, with the implication that the decision to make the investment at the firm level has already been made. As a consequence, revolving funds are most appropriate where adequate demand exists for energy projects as the result of market conditions and government policy, but where the financial market still requires incentives to respond.<sup>19</sup>

Revolving funds, however, do not necessarily address all barriers to bank financing of energy efficiency projects. Revolving funds do not, for example, address such issues as:

- The availability of collateral.
- The ability of applicants to develop adequate proposals.
- Accessibility for companies like SMEs, which often face greater difficulties in obtaining bank financing due to their weaker financial positions, lack of credit history, and/or inability to supply adequate collateral.

## **b) Guarantee Funds**

Guarantee funds help cover the credit risks associated with financing energy efficiency projects with a medium to long term. In such schemes, public or donor funding is pledged (usually up to a ceiling level) to guarantee some of the risk of principal repayment for these loans. Typically, the loan recipient pays an annual fee (usually 1 to 3 percent of the total outstanding balance on the loan) to the guarantor in order to obtain a guarantee for the loan. As a consequence, guarantee funds can help alleviate the barriers to energy efficiency lending that are associated with collateral requirements, the higher risk nature of new technologies, and the risk of longer-term lending. In some cases, guarantee funds are earmarked for groups with greater difficulty in getting loans, such as SMEs. Like revolving funds, guarantee funds can be helpful in building the capacity and willingness of banks to offer energy efficiency loans by subsidizing risks until the banks become familiar with the market and can manage the risks on their own.<sup>20</sup>

Guarantee funds tend to work best in the following situations:

- Where the banking sector is fairly well-developed and liquid (i.e., where available lending capital is not an issue), but where the risks (or perceived risks) of energy efficiency loans is the primary barrier.
- Where there is sufficient market demand for loan financing. Guarantees marginally enhance the credit of a loan applicant by reducing risk, but cannot solve fundamental problems within the banking sector or assist loan applicants with more significant credit issues.<sup>21</sup>
- Guarantee funds may be used in conjunction with loan funds, in cases where the banking sector capacities require support in addition to risk mitigation.

A related instrument, the *Loan Loss Reserve Fund*, provides partial to full protection for a bank's portfolio of small loans as a group, rather than providing guarantees for individual loans, and can be useful in situations where a traditional guarantee is not appropriate. As with guarantee funds, this type of mechanism works best in a developed banking sector.<sup>22</sup>

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<sup>19</sup> LBNL, pp. 21-22

<sup>20</sup> LBNL, p.20-1

<sup>21</sup> WB/GEF EE Portfolio Review, p. 15

<sup>22</sup> WB/GEF EE Portfolio Review, p. 15

### c. Energy Efficiency “Bank Windows”

Energy efficiency “Bank Windows” are bank programs that specialize in making energy efficiency loans and reaching out to potential customers for those loans. In typical arrangements, bank staff are trained to evaluate and understand energy efficiency project risks, specific energy efficiency loan products may be developed, and outreach programs for particular industry segments – e.g., SMEs – may be implemented. Once in place, these programs reduce transactions costs for both the customer and bank, make offering such loans less risky for the bank, and in turn, help facilitate financing.

## **3.4 Energy Services Company Performance Contracts**

Energy Services Company (ESCO) Performance Contracts are innovative financial arrangements that combine the design and implementation of energy efficiency projects with financing and the guarantee of performance (i.e., the customer is guaranteed that he/she will get energy savings out of the project). Significant support for the development of ESCOs and performance contracting in Asia has been provided by the World Bank, financed through GEF. The Asian Development Bank and the U.S. Agency for International Development and other bilateral donors also have provided support for the development of ESCOs and performance contracts. This section will describe ESCOs and the types of performance contracts generally available.

### **3.4.1 What is an ESCO?**

An ESCO is a private company that provides comprehensive energy efficiency services or load reduction services to its clients. Historically, ESCOs grew out of traditional fee-based energy services companies (i.e., auditors) and building contractors. Some ESCOs are “supplier ESCOs.” These types of ESCOs manufacture specific equipment and provide performance guarantees for that equipment alone. There also are ESCOs that were created by utilities (these are rare) that are generally related to utility Demand Side Management (DSM) programs.<sup>23</sup> Under DSM programs, utilities work with their customers to reduce energy use or shift use to non-peak periods, thereby reducing the need for greater generating and transmission capacity on the part of the utility and reducing energy bills for the consumer.<sup>24</sup>

### **3.4.2 What is Performance Contracting?**

Performance contracting involves an ESCO providing energy savings to a customer for a fee. The level of the fee will depend on the amount of savings that the ESCO’s improvements are able to generate for the customer. It is the linkage of performance and payment that defines performance contracting. As a consequence, all performance contractors are ESCOs, but not all ESCOs offer performance contracts.

In a case of performance contracting, the ESCO will perform an energy efficiency audit and develop recommendations and designs based on the audit. The ESCO will then secure financing for the project (upon agreement with the customer concerning recommendations). That financing typically will be based on the stream of energy cost savings that are expected as an outcome of implementing the recommended changes. The ESCO then implements the project. The ESCO assumes the risk of performance of its recommendations. If the changes do not produce savings, then the customer does not pay the ESCO. Typically, all costs associated with the project – beginning with the audit and design – are bundled together, so the customer does not incur any costs until the stream of savings begins.<sup>25</sup> The appeal of performance contracts is that the customer incurs almost no upfront costs for its energy efficiency investments – all payments come out of energy savings.

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<sup>23</sup> WEEA, pp. 2-3

<sup>24</sup> International Institute for Energy Conservation website, [www.iiec.org/index.php?option=com\\_content&task=view&id=126&Itemid=69](http://www.iiec.org/index.php?option=com_content&task=view&id=126&Itemid=69)

<sup>25</sup> WEEA, pp. 3-4

### 3.4.3 Types of ESCO Projects

There are a number of ways that ESCO Performance Contract projects can be structured. The differences in structure have some fairly substantial impacts on how many projects a given ESCO can take on and the types of customers who can avail themselves of ESCO services under a performance contract. The following three models are the most commonly used:<sup>26</sup>

**a) Guaranteed Savings.** Under a guaranteed savings project, the ESCO completes an audit, develops recommendations and designs, makes arrangements for project financing, and implements the project. Key features of a guaranteed savings arrangement include the following:

- *It is the customer who actually borrows the funds and takes on the obligation to repay the loan, not the ESCO. The ESCO usually helps identify financing and facilitates the loan application process.*
- *The ESCO guarantees that the stream of savings from the project will be sufficient to cover the loan payments. If minimum savings targets are not met, the ESCO must pay the customer the difference, thus providing the customer with the funds necessary to repay its bank loan. If the savings minimums are exceeded, then the customer pays the ESCO a percentage of the savings. The ESCO therefore assumes the performance risk, while the bank takes the credit risk.*
- *The customer taking out the loan is subject to the same evaluation as for any other loan, and the loan will appear on the customer's balance sheet. Consequently, a project funded in this manner also will be subject to the customer's own internal evaluation process for any capital investment and therefore compete against other investment options (see discussion of company-based barriers to investment, p. 13 above).*

Most performance contracts in the United States and other developed countries utilize guaranteed savings. Since financing of the project is based on the customer's, and not the ESCO's, financial strength, ESCOs using guaranteed savings can undertake more projects than if they financed the project themselves.

**b) Shared Savings.** Under a shared savings scheme, the ESCO finances the project itself, either from its own capital or by borrowing from a bank. Key features of this approach include:

- *The ESCO assumes both the performance risk and the credit risk associated with the project.*
- *The customer generally must pay a higher percentage of the project's savings to the ESCO than for a "guaranteed savings" project.*
- *If bank financing is used, the bank typically receives rights to the stream of payments as security for the loan or takes a security interest in any equipment that is installed as part of the project.*
- *The customer does not have to borrow, so the project will not appear on the customer's balance sheet. Also, from the customer's perspective the project will be treated as new equity and usually will not be subject to the customer's internal investment criteria.*

The shared savings project is a good alternative for a customer that cannot or will not use its own borrowing capacity for the project. Shared savings contracts are, however, difficult for most ESCOs. Since the ESCO finances these projects itself, the number of shared savings projects an ESCO can undertake is limited by the financial strength of the ESCO. Most ESCOs lack the resources to do many shared savings contracts, particularly if they are small startups, as is often the case in Asia.

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<sup>26</sup> WEEA, pp 4-5

**c) Pay From Savings.** This type of arrangement is a subset of guaranteed savings projects. Under this arrangement, the payment schedule depends on the level of savings. If savings are greater than anticipated, repayment will be faster. If savings are lower than expected, the contract can be extended to allow the ESCO to recover its agreed payment. A related arrangement is the “first out” model, in which the ESCO receives all energy cost savings until it has received its agreed payment.<sup>27</sup> Generally, this arrangement is lower risk for the ESCO, since it receives its full payment more quickly than under the traditional guaranteed savings approach.

### Other models

While the above models are the most commonly used, other models may also be appropriate. In a review of its own energy efficiency portfolio, the World Bank notes that typical Western ESCO models may not offer the best alternatives in the developing world, although an arrangement that allows off-balance sheet financing (shared savings) would be ideal for industry with limited investment capacity. The World Bank specifically lists the following additional models (generally running in order of higher service/higher risk to lower service/lower risk options) and recommends that a variety of approaches should be considered in promoting ESCOs:

**d) End-Use Outsourcing.** In this type of project, the ESCO assumes responsibility for the operation and maintenance of the equipment and/or systems it installs and then sells the output (such as steam, heating/cooling, or lighting) back to the customer at an agreed price. Any costs for equipment upgrades or repairs are typically also the responsibility of the ESCO, although ownership of the equipment usually remains with the customer. This model is also sometimes referred to as *chauffage* or contract energy management.

**e) Equipment Supplier Credit.** In this arrangement, an equipment supplier designs and implements the project, and is responsible for confirming that performance and energy savings match customer expectations. The customer pays for the equipment either on a lump-sum basis after installation or like other performance contracting arrangements, over time, usually from the estimated energy savings. The customer receives ownership of the equipment immediately.

**f) Equipment Leasing.** Equipment leasing is similar to supplier credit in that the supplier receives fixed payments from the estimated energy savings to cover equipment purchase and installation. However, the payments are made as a “lease to own” arrangement, and the supplier retains ownership of the equipment until all the lease payments, and any transfer payments, are completed.

**g) Technical Consultant.** Under this type of arrangement, the ESCO conducts an audit, recommends changes, and assists with implementation. The ESCO receives a performance-based fee, which may include penalties for lower energy savings and bonuses for higher savings. Alternatively, the ESCO may conduct an audit, design the project, and either assist with project implementation or advise the customer for a fixed, lump-sum payment.<sup>28</sup>

### 3.4.4 Barriers to ESCO Performance Contracting

ESCO performance contracting, with its potential for off-balance sheet financing, risk free energy efficiency improvements (from the standpoint of the customer), and expert project design and implementation, offers an attractive solution for the financing of energy efficiency investments. However, significant barriers also exist that make this mechanism difficult to use, particularly in the developing world.

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<sup>27</sup> World Bank GEF, “Energy Efficiency Portfolio Review and Practitioners’ Handbook, 2004, prepared by Jas Singh, p. 10

<sup>28</sup> World Bank GEF, “Energy Efficiency Portfolio Review and Practitioners’ Handbook, 2004, prepared by Jas Singh, pp. 9-11

These barriers include:

- Lack of legal and financial infrastructure to support performance contracts.
- Limited ability of local ESCOs to obtain bank financing or raise equity capital – particularly problematic for new, small ESCOs that are financially weak and lack collateral and credit history.
- Lack of bank experience, both with energy efficiency projects, but also with the financial concept of performance contracts.
- Lack of confidence on the part of banks that ESCO performance estimates will turn out to be accurate.

Thus, ESCO performance contracts can solve financing problems for the enterprise wishing to make an energy efficiency investment, but these contracts do not solve certain fundamental problems associated with obtaining bank financing for ESCO projects. One alternative to bank financing that would allow ESCOs to engage in more shared savings projects is to raise capital through equity investment. Some programs (e.g., the Three Country Energy Efficiency project discussed below) are attempting to help promote equity investment in ESCOs. These investments, however, face some of the same barriers as for bank loans, namely:

- Lack of investor understanding of ESCO services, and
- Lack of capability to evaluate investment risks and potential.

It is too early to tell whether programs directed at raising investment capital for ESCOs will be successful in the developing world.

A GEF-sponsored review of ESCO projects supported through GEF, World Bank IFC and UNDP financing noted the following lessons learned for donor developed ESCO projects:

- Energy pricing policies are a key factor in ESCO development;
- Long-term funding from donors may be needed to develop ESCO markets;
- Viable ESCO markets require well-informed end-users and an educated financial sector;
- Local banks must be involved in ESCO development projects;
- Local legal and taxation issues need to be considered and addressed.<sup>29</sup>

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<sup>29</sup> World Bank GEF, “ Energy Efficiency Portfolio Review and Practitioners’ Handbook, 2004, prepared by Jas Singh, p.11

## 4. REVIEW OF FINANCIAL MECHANISMS AVAILABLE IN NINE ASIAN COUNTRIES

This section provides a description of many of the financial and economic mechanisms and instruments available to industry in the nine Asian countries that participated in the GERIAP project, focusing on *tax incentives; non-tax subsidies; lending programs*, including loan funds, guarantees, and specialized “bank windows;” and *ESCO performance contracting*. This document does not address projects financed through the Clean Development Mechanism (CDM). A separate guide and tool for CDM financing was prepared as part of the UNEP *Energy Efficiency Guide for Industry in Asia* and is available at [www.energyefficiencyasia.org](http://www.energyefficiencyasia.org).

While the attempt was made to include as many programs from each of the countries as possible, it was not possible in this limited study to ensure an exhaustive survey of all programs. The information provided here is intended to help industry identify potential financing assistance, as well as to provide policy makers and other interested parties with models that might be adapted for use in their respective countries. A summary table listing all reviewed programs and providing contact information is provided in Appendix 1.

**TABLE 3. FINANCIAL MECHANISMS IN NINE ASIAN COUNTRIES**

Country	Mechanism					
	Tax Incentives	Subsidies	Lending Programs			ESCOs
			Loan Funds	Guarantee Funds	Bank Windows	
Bangladesh						
China			✓	✓		✓
India	✓		✓		✓	✓
Indonesia						
Mongolia				✓		✓
Philippines	✓		✓			✓
Sri Lanka		✓	✓	✓		✓
Thailand	✓		✓			✓
Vietnam		✓				✓

The main findings of this review include:

- Subsidized energy prices discourage the implementation of energy efficiency projects by artificially reducing the cost of energy and thereby artificially reducing the energy savings associated with greater efficiency.
- The availability of specific financial mechanisms to promote energy efficiency continues to be limited in Asia, as illustrated by Table 4.1 above. Where such mechanisms exist, most are not yet self-sustaining and depend heavily on donor support.
- The most commonly available mechanism is ESCOs. However, while ESCOs reportedly offer performance contracts, in practice, the use of these contracts, unless subsidized by donors, is not common. ESCOs in GERIAP countries face particularly difficult hurdles in obtaining bank financing, and equity investment in these companies is still only a future possibility.
- The second most commonly available mechanism is subsidized loan funds. With the exception of Thailand’s ENCON Fund, all are donor supported. In many of the GERIAP countries, the financial sector continues to require both technical and financial support for the financing of energy efficiency projects.

- There has been little review of the performance of financial mechanisms currently in place in the GERIAP countries. This is due, in part, to the fact that many of these mechanisms are quite new, so it is too early to evaluate their performance. However, in GERIAP countries, as elsewhere, scarce resources often mean that systematic evaluations of programs are not undertaken as a routine part of program implementation.
- Government (or, in fact, donor) programs to facilitate financing of energy efficiency investments should be developed within the context of a larger set of integrated policies that promote demand for energy efficiency among industry and catalyze financial industry response to that rising demand. Policy issues are discussed in greater detail in the GERIAP report, “*Improving Energy Efficiency in Industry in Asia – A Policy Review*,” also available on the GERIAP website.

## 4.1 Bangladesh

While there are no financial mechanisms or incentives currently in place in Bangladesh that specifically target energy efficiency investments,<sup>30</sup> technical assistance programs have been implemented to help improve the availability of financing primarily through capacity building and development of tools, including the development of model performance contract language for use by ESCOs.<sup>31</sup>

## 4.2 China

Energy efficiency policies in China were initiated during the 1970s under the country’s centrally planned economic system and responded to energy shortages that threatened the China’s productive capacity and economic growth. Energy Conservation Service Centers, operating with government support, were created in the 1980s to provide technical energy efficiency services to industry. As China transitioned to a more market-based economy during the 1990s, the Service Centers evolved into Energy Management Contractors (EMCs), the forerunners of today’s EMCs (the preferred terminology for ESCOs in China).<sup>32</sup>

China’s relatively recent transition to a market-based economy has had an impact on the availability of financing for energy efficiency projects. Until 2004, for example, the ability of banks to adjust interest rates to reflect loan risks was restricted. Consequently, bankers developed a conservative approach to loan making that favors only the most creditworthy customers and grants loans to new or less financially strong customers only where a guarantee is provided. Bankers also have been particularly wary of making loans for projects deemed more risky, particularly investments that do not appear to contribute directly to promoting greater profitability.<sup>33</sup>

Few financial mechanisms currently exist in China to facilitate investment in energy efficiency projects. ESCO performance contracts are one source of financing. A related guarantee fund is also in place. In addition, the World Bank is planning an “on-lending” facility for larger projects and the Government of China is considering tax policy to encourage energy efficiency investments. These mechanisms are discussed below.

### 4.2.1 Tax Incentives

China does not currently offer tax incentives for energy efficiency improvements. It is, however, considering imposing additional taxes on energy sources as a means to encourage energy efficiency. Because energy pricing in China is currently in transition from central planning to a more market-based approach, the government prefers to delay any decisions on energy taxes until more

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<sup>30</sup> Email from Mr. Saidul Haq, May 4, 2006

<sup>31</sup> USAID South Asia Regional Initiative/Energy website, [www.sari-energy.org](http://www.sari-energy.org)

<sup>32</sup> EE Policy and CO2, pp. 19-20 and p. 39

<sup>33</sup> 3CEE China Report, p. 11

progress on the transition is made.<sup>34</sup>

#### **4.2.2 Subsidies**

No examples of active subsidy programs in China were found.

#### **4.2.3 Lending Programs**

China has in place, or is in the process of developing, both a loan fund that will offer incentives to commercial banks to begin lending for energy efficiency projects and a guarantee fund to assist China's EMCos (see Section 4.2.4) in obtaining financing for their projects. These programs are discussed below.

##### **a) Loan Fund – World Bank/GEF “On-Lending” Program**

A World Bank/GEF sponsored “on-lending” program is being planned that is intended to help promote direct bank financing of medium to large-sized energy efficiency projects (i.e., projects at least USD 5 million in size). A pool of funds will be provided by the World Bank and GEF to at least two domestic banks, via the Chinese government, for on-lending for energy efficiency projects. In addition to the loan funds, technical assistance will be provided to the participating banks (and possibly other banks) to help build the technical capacity needed to provide energy efficiency lending services. Technical assistance also will be provided to energy-intensive industries to help increase their capacity to mitigate technical risk, and a program to improve government policies aimed at encouraging large-scale energy efficiency investments will be implemented. It is anticipated that the on-lending program will begin in late 2006.<sup>35</sup>

##### **b) Guarantee Fund<sup>36</sup>**

One loan guarantee fund operates in China to support the financing of energy efficiency projects. Formed in late 2003 as part of the World Bank/GEF “China Second Energy Conservation Project,” the EMC Loan Guarantee Special Fund addresses commercial bank reluctance to provide financing to EMCo projects due to the perceived risk of these projects. The fund is operated by China National Investment and Guaranty Company, Ltd. (I&G). I&G was the first company to offer credit guarantees on a national scale in China.

I&G charges fees totaling one to two percent of the value of the loan being guaranteed.<sup>37</sup> In addition, applicants must be able to supply a “counter-guarantee” as security against non-payment or default. Initial counter-guarantee requirements have been very stringent, and included committing personal assets, real estate mortgages, and other collateral. This has limited access to guarantees only to those EMCos large enough to provide the required counter-guarantee. I&G is considering offering guarantees on a project-based lending basis (i.e., the project itself serves – through savings generated – as collateral for the guarantee), but at the writing of this report had not yet tried out the approach in approving a guarantee.

Although the counter-guarantee requirement limits use of the guaranty fund, 23 EMCos have received guarantees for 52 projects to date. The availability of the guarantees has convinced 11 new banks to begin offering loans to energy efficiency projects.

#### **4.2.4 ESCOs**

The ESCO (or EMCo) concept was introduced in China in 1998 through the World Bank and GEF sponsored “China Energy Conservation Project.” The program established three pilot EMCos with

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<sup>34</sup> EE Policy and CO2, p. 46

<sup>35</sup> 3CEE China Report, pp. 17-8

<sup>36</sup> 3CEE China Report, pp. 32-3

<sup>37</sup> EE Policy and CO2, p.40

the goal of demonstrating the potential for a sustainable EMCo and performance contracting market. These pilot companies received technical and financial support from the World Bank and GEF and offered performance contracts based on the full-service, shared savings model<sup>38</sup> that has been successful in other, more developed ESCO markets in the U.S. and Europe. The donor funding provided means that for the duration of the program, these new companies will not need to access local bank financing. By the end of 2005, the three companies had successfully implemented more than 400 projects. Donor funding continues through 2006, at which point the EMCos will begin functioning on a self-sustaining basis.<sup>39</sup>

Since the introduction of EMCos in the late 1990s, more than 100 new enterprises have entered the market.<sup>40</sup> A list of EMCos operating in China is provided in Appendix 2. These new EMCos, however, face considerable barriers, some unique to China and others very similar to the barriers faced by ESCOs in other developing countries. These include:

- Inability of EMCos themselves to raise funds; most are small, start-up companies that lack the financial strength, credit history, and collateral to obtain loan approval for more than one or two projects (if any);
- Poor enterprise accounting systems that make it difficult to calculate savings resulting from EMCo-implemented projects;<sup>41</sup>
- Lack of technical capacity in EMCo staff to prepare adequate business plans to support loan applications or equity investment proposals.
- Inability to implement “guaranteed savings” projects, due to customer unwillingness or inability to obtain financing for a project.<sup>42</sup>

An association of EMCos and related enterprises (energy efficiency equipment providers, energy efficiency service centers, design institutes, law firms, and energy-related publications) was officially established in 2004 with support from the UK Department for International Development (DfID). The Energy Conservation Committee of the China Energy Conservation Association (EMCA) seeks to facilitate the sustainable development of EMCos in China by disseminating information about EMCos and performance contracting, providing training and technical assistance, and serving as a link between the Chinese government and the EMCo industry. EMCA also serves as an important link between EMCos and the implementing agency for an EMCo loan guarantee fund (discussed in Section 4.2.2 above) by providing training and other technical assistance to help loan applicants put together the best possible loan applications.<sup>43</sup>

The Three Country Energy Efficiency project explored the potential for private equity investment to support EMCos, but concluded that the opportunities, at present, are low. This was largely attributed to the following factors:

- A shortage of bank financing for EMCos; equity investors like to see that the companies they invest in have access to bank financing to ensure that their investment can be leveraged.
- Inability of EMCos to put together a clear business plan and strategy that is attractive to potential investors.
- Limitations on equity investment in China; domestic banks, for example, are not able to make equity investments.<sup>44</sup>

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<sup>38</sup> The EMCo conducts an initial audit, designs an energy savings project, obtains financing, implements the project, and shares in the savings with the client.

<sup>39</sup> 3CEE China Report, p. 22

<sup>40</sup> A list of EMCos in China is provided as an attachment to this report.

<sup>41</sup> EE Policy and CO<sub>2</sub>, pp. 40-1

<sup>42</sup> 3CEE China Report, pp. 23-8

<sup>43</sup> 3CEE China Report pp. 24-5

<sup>44</sup> 3CEE China Report, pp., 26-7

## 4.3 India

In 2001, the Government of India (GOI) passed the Energy Conservation Act, which articulated a number of policies to promote development of renewable energy sources and investment in energy efficiency improvements. The Act established the Bureau of Energy Efficiency (BEE) with a mandate to enhance awareness of energy efficiency, establish standards and labeling conventions for energy efficient equipment, develop building codes to promote efficiency, and certify auditors. While BEE has not undertaken any projects that directly promote investment in energy efficiency, BEE programs to accredit organizations and certify individuals to conduct energy audits are intended in part to help ESCOs and energy auditing businesses by increasing bank and venture capital interest and confidence.<sup>45</sup>

Some Indian State governments have programs to promote energy efficiency. These programs generally focus on auditor certifications and financial assistance for energy auditor services.

In 1987, the GOI established the Indian Renewable Energy Development Agency Limited (IREDA), a government-owned non-bank financial institution under the administrative control of the Ministry of Non-Conventional Energy Sources. While IREDA's initial focus was on development of renewable energy sources, its not objectives include "providing financial support to specific projects and schemes for generating electricity and/or energy through new and renewable sources and conserving energy through energy efficiency."<sup>46</sup>

India's programs to facilitate financing of energy efficiency investments include a revolving fund, a bank-based program to create "energy efficiency loan windows," and certain tax incentives. These are discussed in greater detail below.

### 4.3.1 Tax Incentives

A number of tax incentives for energy efficiency investments are offered in India. These include:

- Accelerated Depreciation. The GOI offers 80 percent depreciation in the first year for specified energy efficiency equipment.
- Concessions. Tax concessions are offered on excise and customs duties for "notified" conservation equipment.

### 4.2.2 Subsidies

No examples of active subsidy programs in India for the financing of energy efficiency projects were found. IREDA does offer subsidies for audits and other services related to the development of loan proposals for its loan program (See Section 4.2.3)

### 4.2.3 Lending Programs

#### **a) IREDA Energy Efficiency and Energy Conservation Revolving Loan Fund**

IREDA operates a revolving loan program that provides financing for projects to promote energy conservation and energy efficiency, including projects undertaken by ESCOs and energy end-users for implementation of energy efficiency projects. The fund also finances projects for the production of energy efficiency equipment. The World Bank extended a line of credit to IREDA specifically for developing and financing energy efficiency and conservation projects in India in 2001. That credit line is available through March 2007.<sup>47</sup> Qualifying projects are able to get interest rates below IREDA's usual rates.

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<sup>45</sup> 3CEE India Report, p. 8 and p.23

<sup>46</sup> IREDA website ([www.ireda.com](http://www.ireda.com))

<sup>47</sup> 3CEE India Report, p. 24

### *How the Revolving Fund Works<sup>48</sup>*

A wide range of entities – private and public sector enterprises, non-bank financial institutions and societies, as well as State Electricity Boards – may apply for loans through IREDA. Applicants must meet certain standards of financial strength and creditworthiness, including being profit making companies with no accumulated losses, having a Debt to Equity Ratio of not more than 3 to 1 (5 to 1 for non-bank financial institutions), not having defaulted to IREDA or any other financial institution, and having no erosion of paid-up capital. IREDA loan guidelines allow it to consider applications from companies that are loss-making or that fail to meet the standard for Debt to Equity if a guarantee is provided for the entire loan.

IREDA offers varying interest rates, depending on the type of project and term of the loan. Energy conservation projects (including Demand Side Management (DSM) projects and projects implemented “in the ESCO model”) are eligible for financing of up to 70 percent of the project’s cost at interest rates of 10 to 11 percent for loans with repayment periods of 8 to 10 years, respectively. Energy conservation/efficiency system and equipment purchases (including DSM purchases) are eligible for financing of up to 80 percent of total equipment cost, including the costs of an energy audit and detailed project report at interest rates of 9, 9.5, and 11.5 percent for loans with repayment periods of 6, 7, and 10 years, respectively. If a project qualifies for financing under the World Bank line of credit, IREDA provides a 2 percent interest rate rebate for project financing loans and a 1 percent interest rate rebate for equipment financing loans. IREDA also provides a rebate of 1.5 percent if a borrower supplies a guarantee from a qualified financial institution.

IREDA Revolving Fund loans are subject to fairly common collateral requirements. For project financing, acceptable collateral includes mortgage on immovable assets (i.e., land and buildings), pledging of movable assets, guarantees from project promoters, deposit of post-dated checks for principal loan and interest, a trust and retention account, or any other securities, as required by IREDA. For equipment financing on projects with a value up to Rs 10 million (approximately USD 220,000), collateral

#### **Grants for Loan Applicants**

IREDA offers grant assistance linked to its energy efficiency and conservation loans. These grants help loan applicants meet some of the upfront costs associated with identifying energy efficiency projects and preparing loan applications. For end-user energy efficiency and energy conservation projects, a grant of up to Rs 2 million (USD 44,000) or 4 percent of the value of the loan provided, whichever is smaller, is available for the cost of conducting energy audits and for preparation of detailed project reports. For ESCO promoted projects (shared savings, guaranteed savings or lease rental/fixed payment), a grant of up to Rs 3 million (USD 65,000) or 6 percent of the amount of the loan provided, whichever is smaller, is available to cover the costs of conducting energy audits and preparing detailed project reports, as well as for the costs of preparing the performance contract, including the monitoring and valuation protocol for the project, and other project development costs.

From *IREDA Energy Efficiency and Energy Conservation Guidelines for Loan Assistance*, p. 8

requirements include a Demand Promissory Note for the amount of the loan, pledging of movable assets, a trust and retention account, guarantees from project promoters, deposit of post-dated checks, or additional securities, as required. For equipment purchases with a value greater than Rs 10 million, a mortgage of immovable assets may be supplied, in addition to one of the other acceptable types of collateral already listed. Guarantees from a qualified financial institution may also be supplied in lieu of other collateral.

IREDA offers a reward to existing customers and energy auditors, consultants, and ESCOs for referring

<sup>48</sup> IREDA Energy Efficiency and Energy Conservation Guidelines for Loan Assistance, pp. 3-7

loan applications to IREDA. The reward is Rs 200,000 (approximately USD 4350) or 1 percent of the referred loan, whichever is smaller.

#### **b) Energy Efficiency Loan “Windows”**

India recently participated in a UNEP-World Bank *Three Country Energy Efficiency Project*. Efforts in India focused on increasing the capabilities of banks to make loans for energy efficiency projects and on promoting ESCOs (ESCOs in India are discussed in greater detail in Section 4.3.4, below). The project found that while energy efficiency projects had been financed through banks using donor funds in the past, there was little evidence to suggest that banks continued to make loans for such projects, once donor funds were no longer available.<sup>49</sup>

The Three Country EE Project catalyzed the development of “Bank Energy Efficiency Loan Windows.” The main focus of the program was to work with five banks to help them develop programs that would increase investment in energy efficiency projects, through the issuance of large numbers of small loans to SMEs. The five banks participating in the project were: State Bank of India (SBI), Canara Bank, Union Bank of India (UBI), Bank of India, and the Bank of Baroda (BOB). While each bank developed its own approach for its SME program, some common features included slightly reduced interest rates from the banks’ standard rates, assistance with the costs of audits or detailed project reports (though these types of benefits tend to be limited to earliest loan applicants), and waiving of loan processing fees for some customers. Most of the banks are currently offering loans only to existing customers; only one is taking loan applications from new customers. A second bank is taking new customer under very limited circumstances.<sup>50</sup>

A summary of the five banks’ programs is provided in Appendix 3. It is hoped that by improving the capabilities of these banks to provide loans, they will develop sustainable programs, and that the success of those programs will induce other banks to enter the market.

### **4.3.4 ESCOs**

While there are ESCOs operating in India, the ESCO industry has not yet had any real impact on financing and implementation of energy efficiency projects in India. A USAID-sponsored project in the mid-1990s initiated three ESCOs with links to ESCOs in the U.S. The current market consists of about 20 consultant ESCOs that developed out of energy auditors and some supplier ESCOs marketing their own equipment.

ESCOs in India suffer from many of the same problems encountered by ESCOs elsewhere in Asia:

- Banks lack confidence in the technical credibility of ESCOs, believing that ESCOs have an incentive to overstate potential project savings.
- The financial strength of ESCOs is generally not sufficient to obtain loans.

In addition, the Three Country EE Project concluded that ESCOs in India did not, at present, have the financial expertise required to engage in Performance Contracting.

The Three Country EE project is attempting to improve the situation for ESCOs in India by seeking venture capital financing, increasing ESCO interaction with the five Energy Efficiency Loan Window banks, and supporting the recently organized Indian Council for Promotion of Energy Efficiency Business (ICPEEB), an association of ESCOs, energy auditors, and equipment vendors. ICPEEB has plans to promote ESCOs.<sup>51</sup>

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<sup>49</sup> 3CEE India Report, p. 33

<sup>50</sup> 3CEE India Report, pp. 36-42

<sup>51</sup> 3CEE India Report, pp. 53-60

## 4.4 Indonesia

There are few financial mechanisms and incentives that specifically encourage investment in energy efficiency projects in Indonesia. The German development bank, KfW, supports a loan and targeted technical assistance program for Indonesian banks to encourage them to lend to SMEs for a wide range of environmental projects. Some of these projects involve energy efficiency improvements. Loans are generally made at market interest rates, and other requirements, such as collateral, apply. The objective of the KfW program is to improve SME access to bank financing.<sup>52</sup>

ESCOs are being introduced in Indonesia, but at present, none are yet offering services under performance contracts.<sup>53</sup>

## 4.5 Mongolia

Like China, Mongolia has been transitioning from a planned to a market economy since 1990. The power sector is now run on a market-based model, and Mongolia has plans to privatize it further. A significant effort is being put into promotion of renewable energy sources.<sup>54</sup> A draft law on energy efficiency has been completed with the hope that it will be enacted by the end of 2006.<sup>55</sup>

While there also is interest in energy efficiency, Mongolia has very few initiatives to promote investment in industrial energy efficiency improvements, and these initiatives, like those in other GERIAP countries, have been dependent on donor support. Mechanisms available in Mongolia to help finance energy efficiency investments in industry include ESCO performance contracting and a new guarantee fund. These are discussed below.

### 4.5.1 Tax Incentives

No examples of active tax or tax incentives programs in Mongolia were found.

### 4.5.2 Subsidies

No examples of active subsidies in Mongolia were found.

### 4.5.3 Lending Programs

#### a) Guarantee Fund

Mongolia also is developing a Green Credit Guarantee Fund (GCGF) as part of the “New 21 Project,” a Netherlands-funded project to promote ESCOs (discussed in greater detail in Section 4.5.4 below). The purpose of the fund is to provide a supplemental collateral guarantee for energy efficiency improvements, green investments, and cleaner production projects. Eligible guarantee recipients include ESCOs, as well as other enterprises and entities seeking financing for these types of projects. It is hoped that the GCGF will help address one of the primary barriers to financing of energy efficiency and other environmental improvement projects, inadequate collateral. In addition, it is anticipated that loans guaranteed by the fund will be given at rates below market, reflecting the reduced risk provided by the guarantee. The GCGF is funded at an initial level of USD 400,000 and is overseen by the Mongolian National Chamber of Commerce and Industry (MNCCI). Golomt Bank of Mongolia will manage the Fund, which is scheduled to begin operations at the end of June 2006.

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<sup>52</sup> KfW Indonesia brochure, p. 10

<sup>53</sup> Email from Indriyati, Agency for the Assessment and Application of Technology (BPPT) June 20, 2006

<sup>54</sup> East Asia REEEP Regional Consultation Meeting, 2003, Section 3.5

<sup>55</sup> “Promoting EE Investments in Mongolia’s Industries – Establishment of the ESCO “ New-21 Project, presentation by G. Tumenjargal, p. 7

Entities wishing to obtain guarantees must meet certain criteria, among them:

- No existing bad debt with any bank or creditor.
- Liability ratio of less than 30 percent.
- Have profitable operations for at least the past year.
- No defaulted project with the Fund.

Guarantees may be made through the fund for sums of 30 to 80 percent of the total value of the loan, and any entity may have at most two projects receiving guarantees at any one time. Guarantees for any one project may not exceed 10 percent of the Fund's total capital, which, with the current funding levels, caps guarantees as USD 40,000.<sup>56</sup>

#### 4.5.4 ESCOs

With support from the Netherlands, the MNCCI launched the "New 21 Project" in October 2001. The objectives of the "New 21 Project" – which will run through June 2007 – include:

- Creating a legal environment in Mongolia that facilitates the development of ESCOs.
- Raising awareness of the business value of energy efficiency and the role of ESCOs in helping businesses implement energy efficiency projects.
- Developing funding sources for ESCOs.
- Developing technical and marketing resources for ESCOs, including lists of potential ESCO products and services, lists of potential clients, a model performance contract, and technical training and workbooks.

The program established three pilot ESCOs, which have initiated demonstration projects at two private enterprises and in one government building. The projects involve modifications to air compressors and improvements to a building heating system, and all have relatively short pay-back periods (3 to 5 years). All projects involve shared investment by the ESCO and shared energy cost savings once the improvements are in place.<sup>57</sup>

Financing for these pilot projects has been provided by the Netherlands. MNCCI is planning to sign a Memorandum of Understanding for a Strategic Partnership Agreement with seven Mongolian banks. The goal is to develop a self-sustaining investment mechanism for energy efficiency, as well as for cleaner production programs.<sup>58</sup>

## 4.6 Philippines

Energy efficiency efforts in the Philippines largely target home users and the transportation sector. The Philippines Energy Resource Center (PERC) provides information and services on energy efficiency to industry to help facilitate implementation of improvements in exchange for reporting on energy use. These services include assessments of energy use and efficiency potential, as well as referrals to ESCOs.<sup>59</sup> The Energy Management Association of the Philippines (ENMAP) is a professional association of energy managers, energy engineers, and consultants that promotes energy management and engineering technologies and applications in the Philippines. ENMAP puts on training for the private sector and operates as a conduit for government technical assistance.<sup>60</sup>

Financial mechanisms available to support the implementation of energy efficiency projects include ESCO performance contracts, a loan program, and tax incentives applicable to energy efficiency

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<sup>56</sup> Email communication from Sambuu Demberel, MNCCI, June 23, 2006

<sup>57</sup> "Promoting EE Investments in Mongolia's Industries," pp. 6-12

<sup>58</sup> World Business Council for Sustainable Development, Regional Network News, June 1, 2005,

[www.wbcsd.org/plugins/workspace/message.asp?WspaceId=116&msgId=NDgwMw](http://www.wbcsd.org/plugins/workspace/message.asp?WspaceId=116&msgId=NDgwMw)

<sup>59</sup> See NEECP website, [www.doe.gov.ph/neccp/default.htm](http://www.doe.gov.ph/neccp/default.htm).

<sup>60</sup> ENMAP website, [www.enmap.org.ph](http://www.enmap.org.ph)

projects.

#### **4.6.1 Tax Incentives**

While the Philippines does not have tax incentives programs that specifically target energy efficiency investments, it does have incentives programs that may apply to energy efficiency technologies.

The Philippines Economic Zone Authority (PEZA) provides incentives for PEZA-located companies that invest in energy efficient equipment or energy efficiency systems. Industry or ESCOs in these zones could, therefore, be eligible for PEZA incentives, if they are located in PEZA designated areas.<sup>61</sup>

#### **4.6.2 Subsidies**

No examples of active subsidies in the Philippines were found.

#### **4.6.3 Lending Programs**

The Philippines participated in the GEF-financed Efficiency Lighting Initiative (ELI) from May 2000 to December 2003. ELI promoted the development of financing programs to support the implementation of efficiency lighting projects (particularly through ESCO performance contracts) in cooperation with the Development Bank of the Philippines (DBP).<sup>62</sup> Although ELI officially ended in the Philippines in 2003, DBP continues its Efficient Lighting Initiative loan program. The objectives of DBP's ongoing program are:

- To contribute to the attainment of national energy efficiency and environmental protection goals.
- To accelerate the growth of markets for energy efficient lighting technologies.
- To promote energy saving performance contracting as a sustainable climate change mitigation strategy by providing opportunities for the government, banking and ESCO sectors.
- To be a leader in ESCO project lending in the Philippines through conduit banks/Participating Financial Institutions (PFIs).

Under DBP's ELI program, the following activities are eligible for loan assistance:

- Procurement and installation of "ELI Qualified" Lighting Facilities (e.g. lamps, lighting fixtures/control systems, wiring of lighting system, equipment, etc) and other related facilities.
- Conduct of investment grade efficiency audits.
- Efficient lighting system retrofits, including electrical system upgrades.<sup>63</sup>

DBP will consider loan applications from PFIs, ESCOs, and other entities in the power sector with at least 70 percent Filipino ownership. Loans can be made for up to 80 percent of the estimated cost of the project, leaving a required borrower's equity of 20 percent. Interest rates are market-based, but are fixed throughout the term of the loan. Standard collateral requirements also apply, but DBP will also consider collateral that includes assignment of the performance contract or the project's cost savings to the bank. The allowable repayment period for these loans is from four to seven years inclusive of a one year grace period. DBP allows customers to repay the loans out of savings from the projects.<sup>64</sup>

#### **4.6.4 ESCOs**

The Philippines had 16 active ESCOs at the drafting of this report (a complete list is included in

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<sup>61</sup> Email from Alice Herrera, President, Energy Management Association of the Philippines, May 25, 2006

<sup>62</sup> ELI website, [www.efficientlighting.net/philippines](http://www.efficientlighting.net/philippines)

<sup>63</sup> ELI website, [www.efficientlighting.net](http://www.efficientlighting.net)

<sup>64</sup> Emails from Julietta Salvatierra, Development Bank of the Philippines, June 16 and June 19, 2006

Appendix 4).<sup>65</sup> These include utility ESCOs, supplier ESCOs, and full-service ESCOs. A variety of approaches are used by these ESCOs in structuring performance contracts. As is the case in other GERIAP countries, ESCOs in the Philippines face significant barriers in obtaining bank financing.<sup>66</sup> ELI facilitated the use of ESCOs to provide lighting efficiency improvements through the development of model ESCO transaction documents, such as requests for proposals (RFPs) and energy services agreements (ESAs). A model ESCO performance contract can be found at the National Energy Efficiency Center of the Philippines (NEECP) website.<sup>67</sup>

## 4.7 Sri Lanka

The Government of Sri Lanka operates two programs that promote the development of renewable energy sources and energy efficiency, providing a range of technical assistance. The “Renewable Energy for Rural Economic Development (RERED) project (initiated with support with from the World Bank and GEF) aims – as its name suggests – to “expand the commercial provision of renewable energy resources, with a focus on improving the quality of life in rural areas through the use of electricity as a means to further income generation and social service delivery.”<sup>68</sup> While the bulk of RERED work is on developing grid and off-grid renewable sources (mini-hydro, biomass, wind, and solar power), RERED also supports energy efficiency initiatives for industry.

The recently created Energy Conservation Fund, under the Ministry of Power and Energy, provides a range of training, technical assistance, and tools for energy users, with an emphasis on energy efficiency and the development of non-conventional renewable energy sources. The Energy Conservation Fund provides consolidated management and oversight of programs supported by funding from the Government of Sri Lanka, as well as from other donors.<sup>69</sup>

Financial mechanisms supporting energy efficiency initiatives in Sri Lanka include loan funds, a guarantee fund, ESCO performance contracts, and subsidies for purchase of energy efficient lighting.

### 4.7.1 Tax Incentives

No examples of tax or tax incentives programs were found.

### 4.7.2 Subsidies

While no direct subsidy programs currently exist in Sri Lanka, the Ceylon Electricity Board does provide subsidized prices for compact fluorescent lamps (CFLs), as well as interest free loans for the purchase of the lamps as part of its DSM program.<sup>70</sup>

### 4.7.3 Lending Programs

Sri Lanka currently has two loan programs and a guarantee fund in place that provide financing or support financing for energy efficiency projects.

#### **a) E-Friends Fund**

The “*Environmentally Friendly Solutions Fund*,” or *E-Friends Fund*, provides technical assistance and low-cost loans to SMEs for industrial waste minimization, resource recovery, energy savings, and pollution control and abatement. Funded by the Japan Bank for International Cooperation (JBIC),

<sup>65</sup> List of energy auditors and ESCOs, Philippines National Energy Efficiency and Conservation Program website, [www.doe.gov.ph/neccp/default.htm](http://www.doe.gov.ph/neccp/default.htm)

<sup>66</sup> Email from Raymond Marquez, Trigen Energy, June 12, 2006

<sup>67</sup> ELI website, [www.efficientlighting.net/philippines](http://www.efficientlighting.net/philippines)

<sup>68</sup> RERED website, [www.energyservices.lk/thproject/objectives.htm](http://www.energyservices.lk/thproject/objectives.htm)

<sup>69</sup> Energy Conservation Fund website, [www.energy.gov.lk](http://www.energy.gov.lk)

<sup>70</sup> Email from Nihal Cooray, Small and Medium Enterprise Developers (SMED), June 10, 2006

E-Friends General Loans can be obtained for a variety of equipment purchases, including equipment that reduces energy use. Loans are made at an interest rate of 6.5 percent (a below market rate) for an amount of up to 50 million LKR (USD 481,000). Repayment periods for these loans can be up to ten years, inclusive of a two year grace period. In addition, businesses that obtain a general loan for equipment purchases also may apply for a Technical Assistance Loan to cover the costs of consulting services related to the design and installation of equipment funded by the general loan. These loans carry an interest rate of two percent, and are available for amounts up to LKR 750,000 (USD 7215). Technical assistance loans must be repaid within five years, inclusive of a one year grace period.<sup>71</sup>

#### **b) RERED Credit Programme**

Sri Lanka's RERED program also operates a loan fund aimed at providing access to credit for ESCOs and other end-users interested in implementing energy efficiency projects. The *Credit Programme* is an on-lending program funded by the World Bank and GEF, and is administered by the DFCC Bank. Eligible investments include development of grid and off-grid power projects and other renewable energy investments, as well as energy efficiency, conservation, and DSM projects. Loans are made through participating credit institutions (mainly commercial banks), which receive refinancing from the program for up to 80 percent of an approved loan amount. Loan applicants must meet the banks' criteria for creditworthiness.<sup>72</sup> Interest rates for the loans are determined by the participating banks in agreement with loan recipients. Other requirements (such as pledging of collateral) also are determined by the participating banks.<sup>73</sup>

#### **c) Guarantee Fund**

A guarantee facility also has been established in Sri Lanka to help address barriers to loan financing and to help reduce the costs of borrowing.<sup>74</sup> The program is operated as part of the Energy Conservation Fund, and with an initial funding level of LKR 50 million (USD 481,000) is expected to support LKR 400 million (USD 3.85 million) in energy efficiency investments. The fund operates as a loss reserve fund and will provide guarantees up to 75 percent of the total amount of a loan approved by a participating financial institution. Borrowers obtaining guarantees are charged an annual premium equal to 0.5 percent of the outstanding loan balance (a below market rate). To ensure that loans guaranteed by the fund are given to creditworthy customers, the Fund has established its own credit standards for borrowers. These standards include:

- A favorable letter of reference from their bank;
- A favorable Credit Information Bureau (CRIB) report;
- Positive operating cash flow for the most recent year;
- Positive net income for the most recent 2 years; and
- A debt-service-coverage ratio of 1.25. (This ratio is defined as earnings before interest, taxes, depreciation, and amortization as a percentage of interest plus current maturities on long-term debt. Cost savings from implementing the energy efficiency project may be included in the calculation.)<sup>75</sup>

Eligible borrowers include industrial enterprises, service providers and project developers seeking to implement projects, the primary purpose of which must be energy savings and conservation. Banks making loans that receive guarantees from the fund are expected by the Sri Lankan government at an interest rate below a participating bank's market rates for similar loans to account for the reduced risk. Loans covered by the guarantee must have a payback period of no more than six years.<sup>76</sup> The first three guarantees under the SGF were issued in May 2006.<sup>77</sup>

<sup>71</sup> See Sampath Development Bank website, [www.sampath.lk/development.htm](http://www.sampath.lk/development.htm)

<sup>72</sup> See the RERED website, [www.energyservices.lk/theproject/implementation.htm](http://www.energyservices.lk/theproject/implementation.htm)

<sup>73</sup> RERED Operating Guidelines, May 2006,, available at:

<sup>74</sup> Technical assistance for the development of the SGF was provided by USAID's South Asia Regional Initiative for Energy Cooperation and Development (SARI-Energy).

<sup>75</sup> Sustainable Guarantee Facility (SGF) Sri Lanka, May 2004, prepared by Nexant for the Energy Conservation Fund/Ministry of Power and Energy, pp 3-1 to 3-5,

[www.sari-energy.org/ResourceReports.asp?Cat=1&Title=All&Type=0&Month=All&Year=All&Country=Sri%20Lanka](http://www.sari-energy.org/ResourceReports.asp?Cat=1&Title=All&Type=0&Month=All&Year=All&Country=Sri%20Lanka)

<sup>76</sup> SGF Sri Lanka, pp. 5-1 to 5-2

<sup>77</sup> Energy Fund website, [www.energy.gov.lk/news/insurance\\_of\\_guarantee.asp](http://www.energy.gov.lk/news/insurance_of_guarantee.asp).

#### 4.7.4 ESCOs

A small (12 are currently operating), but growing ESCO industry exists in Sri Lanka. These ESCOs operate mainly in coordination with projects under the Energy Conservation Fund, which keeps a list of certified ESCOs. Some of them offer performance contracts. While the loan and guarantee funds discussed above are available to industrial end-users as well as ESCOs, a significant objective of those programs is to help promote use of ESCO performance contracting in Sri Lanka.

### 4.8 Thailand

The Government of Thailand has been fairly proactive in developing and implementing programs designed to facilitate adoption of energy efficiency and conservation measures. Much of this activity has been financed through the Energy Conservation Promotion (ENCON) Fund. The ENCON Fund, created as part of Thailand's Energy Conservation Promotion (ENCON) Act in 1992, receives revenue from a dedicated tax of THB 0.04 (USD 0.001) per liter levied on all petroleum products sold in the country. This tax raises about THB 2 billion (USD 50 million) per year.

In addition to establishing the ENCON Fund, the ENCON Act established the following two programs:

- A compulsory program for large energy users, called "designated facilities." Designated facilities are companies with over 1 MW peak energy demand or which consume more than 20 TJ of energy annually. These facilities must: 1) appoint an energy manager; 2) collect and submit energy use data; 3) conduct energy efficiency audits; 4) develop energy use reduction targets; and 5) develop and submit plans for energy efficiency improvements.
- A voluntary program for smaller facilities that use less energy. The voluntary program targets SMEs.

Three government agencies located in the Ministry of Industry have primary responsibility for energy efficiency: 1) the Department of Alternative Energy Development and Efficiency (DEDE); 2) the Energy Policy and Planning Office (EPPO); and 3) the Electricity Generating Authority of Thailand (EGAT).<sup>78</sup> The Bureau of Investment (BOI) also supports energy efficiency projects through the provision of tax incentives.

Energy efficiency financing mechanisms in Thailand include a revolving loan fund, tax relief and tax subsidies, and a small, but growing ESCO sector. These mechanisms are described below.

#### 4.8.1 Tax Incentives

Thailand has a number of tax incentives established to encourage investment in energy efficiency:

- Pilot Program for Tax Privilege for Energy Conservation. In August 2005, the Thai Government announced a new program that would provide tax incentives for energy efficiency measures. The program is available to both building and factory owners and provides a tax deduction for 100 percent of the savings generated by an energy efficiency investment, up to a cap of THB 2 million (USD 50,000). Participating businesses must be able to document their savings. In the case of businesses where production changes affect the amount of energy used, participants are allowed to demonstrate savings per unit of production. Applications to participate must identify the measures to be taken and estimate expected savings, outline a plan for verification of conservation results, and have an auditor. DEDE assigns an inspector to verify information. After changes are implemented and documented, the DEDE inspector approves the reported saving. A committee then reviews all claims and signs off on them. At that point, the

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<sup>78</sup> APEC Case Study, pp. 2-3

participant produces evidence of taxes paid and receives a tax refund, based on his documented savings.<sup>79</sup>

- **Cost-Based Tax Incentives Program.** Companies can receive a 25 percent tax break for investing in projects that result in efficiency improvements. The tax incentives apply to the first THB 50 million (USD 1.25 million) invested, and can be spread over 5 years.
- **Import Duty Exemption.** The BOI offers an exemption on import duties for new investments in energy conservation businesses, such as high efficiency machines or equipment and renewable energy equipment and manufacturing, solar PV manufacturing, ESCOs, and in renewable energy production businesses, such as the use of alcohol or fuels derived from agricultural products and electricity or steam generation.

## 4.8.2 Subsidies

In 2002, DEDE established a subsidy program in conjunction a revolving fund (see Section 4.7.3). The purpose of the program was to assist SMEs which had small projects or lacked the financial strength to obtain commercial financing and therefore would be unlikely to benefit from the revolving fund. That program provided a subsidy of up to 30 percent of the cost of qualifying energy efficiency investments. Two options for participation were available: 1) an applicant could select one of the specifically identified “standard measures” (equipment deemed by the government to be efficient), or 2) an applicant could submit a customized “individual” project. Funding allocated for the program was completely distributed within four months and no new funding was allocated.

One reason for not continuing the program was the Thai government’s interest in subsidies that would be based on performance, rather than cost. The Thai government recently initiated such a program (see 4.8.1 Tax Incentives, above).

## 4.8.3 Lending Programs

### **a) Energy Efficiency Revolving Fund**

Thailand’s Energy Efficiency Revolving Fund was established in late 2002 using funds allocated from the ENCON Fund. The idea for the fund originated with a private sector bank, the Industrial Finance Corporation of Thailand (IFCT). IFCT had been involved with a World Bank program to provide loan financing for the replacement of inefficient chillers in air conditioning systems and was interested in the potential for a program that would help fund all types of energy efficiency projects. IFCT offered a proposal to DEDE, which ultimately became the Energy Efficiency Revolving Fund.<sup>80</sup> Phase I of the Fund operated through 2005 and is being followed by Phase II in 2006.

#### *How the Fund Works*

DEDE provides general oversight and management of the fund, working with six banks, which receive and process loan applications.<sup>81</sup> Each bank received a credit line at no interest from the ENCON Fund of THB 100 to 400 million (USD 2.5 to 10 million) to provide loans for energy efficiency projects. Loans provided by the program are capped at a below market interest rate of 4 percent. The 4 percent interest rate covers bank administrative expenses, some of the risk associated with the loans, and a small profit for the banks. Banks are free to provide loans at a lower interest rate, and in practice, some of the banks provided loans at interest rates as low as 2.7 percent for existing customers with strong credit. Participating banks take the full risk of repayment of the loan. They must repay their credit line to the ENCON Fund, even if a loan is in default. Banks are allowed to terminate any loan in default, and are free to restructure loans in default at significantly

<sup>79</sup> “Pilot Project on Tax Privilege for Energy Conservation,” DEDE, ([www.dede.go.th](http://www.dede.go.th))

<sup>80</sup> APEC Case Study, pp. 8-9

<sup>81</sup> The six banks are: Bank Thai, Bangkok Bank PCL, Sri Ayutthaya Bank, TMB Bank (a merger of Thai Military Bank and IFCT), Siam City Bank, and Siam Commercial Bank.

higher interest rates and to take action, including seizing collateral, to recover any funds owed.

Any project meeting the definition of an “energy conservation project” under the ENCON Act is eligible for loan funding. These include projects to: improve the combustion of fossil fuels, prevent energy loss, recycle waste, substitute a more efficient energy type for a less efficient one, improve electricity efficiency, and install energy efficient machinery or equipment, including operations control systems. Loan funds can be used to purchase and install equipment, cover design and supervision fees, construct works necessary for the installation and operation of equipment (e.g., foundations, pipelines, etc.), and transportation costs, including duties and value added tax (VAT). Initially, loans were made only to Designated Facilities. However, in May 2004, DEDE decided to expand the program to all commercial and industrial enterprise, as well as to ESCOs.

Loans made under the fund can be no larger than THB 50 million (USD 1.25 million) with a payback period of no longer than seven years. The cap of THB 50 million was established to ensure that loan funding would target mid-sized projects, such as replacement of chillers. DEDE was interested in spreading available funds among more projects and to more businesses, and it was generally thought that larger projects would be more likely to attract commercial financing on their own. In practice, some larger projects (e.g., installing a co-generation facility) have been financed using a Revolving Fund loan combined with additional bank financing, usually provided at higher market rates.

The process for getting a loan from the Revolving Fund involves six stages – identifying a project, conducting a detailed feasibility study of the project and preparation of a loan application, financial analysis of the loan application by the bank, DEDE technical evaluation and approval of the project, final loan approval, disbursement of funds and implementation of the project, and finally, loan repayment.

Banks apply their standard lending criteria in evaluating loans applications under the Revolving Fund. Banks participating in the program are primarily concerned with the capacity of the applicant to repay the loan principal and interest, as well as with the value and quality of collateral offered as security (generally a mortgage over land, a building or equipment). The evaluation therefore focuses on the financial strength of the loan applicant (based on its balance sheet and assets) and not on the cash flows and savings anticipated from the project itself. Participating banks have been reluctant to make loans to applications that do not have adequate collateral. Some banks have been willing to loan to new customers, while others have preferred to limit loans to existing customers.

### *Changes for Phase II*

In March 2006, DEDE announced the continuation of the Revolving Fund, with the contribution of THB two billion (USD 50 million) from the ENCON Fund. Some changes will be made to the Fund for Phase II, primarily to expand the number of banks that gain experience in energy efficiency lending and to encourage the development of a sustainable market for energy efficiency financing by requiring greater commitments from the participating banks. First, five additional banks have been recruited to participate in the fund.<sup>82</sup> This will extend the program’s reach to new customers and expose more banks to energy efficiency financing. Second, credit lines will no longer be provided at zero interest, instead, a low interest rate of 0.5 percent will be charged. Also, banks will be required to commit their own funds to energy efficiency loans, in addition to the credit line they receive from the ENCON fund. In its press release announcing Phase II, DEDE noted that commitments from the banks would total THB 10 billion (USD 250 million). While some consideration was given to increasing the maximum size of loans available under the Fund, the cap will remain at THB 50 million.<sup>83</sup>

### *Fund Performance*

As of June 2005, the Energy Efficiency Revolving Fund had issued loans for 66 projects (by the end of Phase I, that number rose to 81). Only two projects that submitted applications did not receive

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<sup>82</sup> The additional banks are: Krung Thai Bank, Kasikorn Bank, Small and Medium Enterprise Development Bank of Thailand, the Export-Import Bank of Thailand, and United Overseas Bank.

<sup>83</sup> DEDE Announcement, [www.dede.go.th/dede/fileadmin/upload/pic\\_sometime/PR\\_RevolvingFund.pdf](http://www.dede.go.th/dede/fileadmin/upload/pic_sometime/PR_RevolvingFund.pdf)

approval for loans. It is generally believed that the high approval rate is the result of a requirement for a detailed feasibility study; only high quality applications were submitted to the banks. In addition, as of June 2005, there had been no defaults on any loan issued as part of the program. For every dollar loaned under the program, it has been estimated that ten dollars in lifetime energy savings have been achieved. Also, it is estimated that every dollar committed by the ENCON Fund has generated 0.60 dollars in leveraged funds from the participating banks, even without a requirement for bank contribution.

The Revolving Fund, however, has not been particularly successful in providing financing to ESCOs. Only two such loans had been made by June 2005. Bankers in Thailand continue to be reluctant to approve loans for applicants with poor quality collateral. ESCOs in Thailand, as elsewhere, do not have substantial land, buildings, or equipment to offer as security for loans.<sup>84</sup>

It does appear that the Fund may be succeeding in building bank capacity to take on energy efficiency lending as part of their regular business. At at least one participating bank, loan applications for common energy efficiency projects (e.g., replacement of air compressors, lighting upgrades, and so forth) are now handled by the bank's regular commercial lending department. Only applications involving new and innovative technologies are handled by the bank's environmental department.<sup>85</sup>

### **b) Guarantee Fund**

The Government of Thailand has considered developing a guarantee fund to work in tandem with the Revolving Fund. Such a fund would help increase the likelihood that loans could be made to ESCOs, as well as to SMEs. Participating banks also favored the plan to increase their ability to lend to customers with weak collateral. A study was completed by GEF in 2003 and 2004 that resulted in a plan for a pilot project, but a final decision on whether to move forward with the pilot project was delayed pending implementation of Phase II of the Revolving Fund. If DEDE decides to move forward with the guarantee fund plan, the Thai government will apply for GEF funding.

Thailand does have an existing guarantee fund to assist SMEs in obtaining loans. This fund can guarantee loans for a wide range of projects, including energy efficiency initiatives.

## **4.8.4 ESCOs**

Thailand has a small, but growing ESCO sector. At present, there are 4 to 5 full service ESCOs operating (i.e., companies that do comprehensive audits and recommend improvements. There also are a number of "supplier ESCOs" that offer performance guarantees for equipment that they manufacture and install. As noted in the discussion of the Revolving Fund above, financing continues to be a major barrier for ESCOs providing performance contracts.

## **4.9 Vietnam**

Vietnam has a limited number of programs to promote investment in energy efficiency projects. These programs are aimed mainly at increasing demand for such projects among industry and include subsidies and ESCO performance contracts.

### **4.9.2 Tax Incentives**

No examples of taxes or tax incentives programs in Vietnam were found.

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<sup>84</sup> A very detailed discussion of the history of the Revolving Fund and its performance, can be found in "Thailand's Energy Efficiency Revolving Fund: A Case Study," prepared for APEC in July 2005 and available online at [www.reep.org/media/downloadable\\_documents/8/p/APEC%20-%20EE%20Revolving%20Fund%20-%20Thailand.pdf](http://www.reep.org/media/downloadable_documents/8/p/APEC%20-%20EE%20Revolving%20Fund%20-%20Thailand.pdf)

<sup>85</sup> Conversation with Anat Prapasawad, TMB Bank, June 7, 2006

## 4.9.2 Subsidies

The World Bank/GEF-sponsored *Vietnam Demand Side Management and Energy Efficiency Project* is working with the Ministry of Industry to implement a Commercial Energy Efficiency Pilot Program to develop and test energy efficiency business models and promote the development of a sustainable market for energy efficiency services. The objective of the program is to stimulate the market for energy efficiency investments and demonstrate the viability of these types of projects. As part of that program 210 enterprises will receive assistance for 25 to 40 percent of the cost of energy efficiency projects, up to a cap of USD 38,000. Eligible projects must have a minimum cost of USD 10,000 to qualify for the subsidy.<sup>86</sup> The project is focusing initially on commercial buildings, hotels, and textile processing plants in Hanoi, Ho Chi Minh City, Da Nang, and Hai Phong.<sup>87</sup> Available subsidies will be reduced in successive years of the project, with support available for 19 to 30 percent of costs up to a cap of USD 28,500 in year two and 13 to 20 percent of costs up to a cap of USD 19,000 in year three.<sup>88</sup>

## 4.9.3 Lending Programs

No examples of lending programs in Vietnam were found. However, Vietnam is currently studying the possibility of establishing a *Green Credit Line for Sound Technology for Cleaner Production*, which could provide support for energy efficiency projects.

In addition, there are several other funds operate in Vietnam that, while not dedicated to financing energy efficiency projects, may provide support for energy efficiency investments:

- Vietnam Environmental Protection Fund
- Revolving Fund for Industrial Pollution Control in Businesses in Ho Chi Minh City
- Industrial Pollution Minimization Fund in Ho Chi Minh City
- Hanoi Environmental Protection Fund
- Environmental Protection Fund for the Coal Industry<sup>89</sup>

## 4.9.4 ESCOs

Donor programs also have helped initiate a market for ESCOs in Vietnam, with most operating in the larger cities such as Hanoi or Ho Chi Minh City.<sup>90</sup>

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<sup>86</sup> “Enterprises may cut expenses by saving energy – The commercial energy efficiency programme (CEEP) will streamline enterprises by curbing expenses through lowering electricity wastage,” June 6, 2006, [www.dost-dongnai.gov.vn/e9ttchitiet.asp?idd=6456](http://www.dost-dongnai.gov.vn/e9ttchitiet.asp?idd=6456)

<sup>87</sup> “Energy efficiency program launched – The Electricity Regulatory Authority of Vietnam yesterday introduced a pilot program aimed at making energy use by businesses more efficient,” May 19, 2006, [www.asemconnectvietnam.gov.vn/detail.aspx?id=7673](http://www.asemconnectvietnam.gov.vn/detail.aspx?id=7673)

<sup>88</sup> Email from Le Thanh Tung, Vietnam Cleaner Production Center, June 5, 2006

<sup>89</sup> Email from Le Thanh Tung, Vietnam Cleaner Production Center, June 5, 2006

<sup>90</sup> Email from Le Thanh Tung, Vietnam Cleaner Production Center, June 5, 2006

*TO BE INSERTED:*

## **References**

## **List of Acronyms**

### **Appendix 1. List of EMCos Operating in China**

### **Appendix 2. Summary of Energy Efficiency Bank Window programs in India**

### **Appendix 3. List of ESCOs Operating in the Philippines**

### **Appendix 4. Summary of Financial Mechanisms Available in GERIAP Countries**