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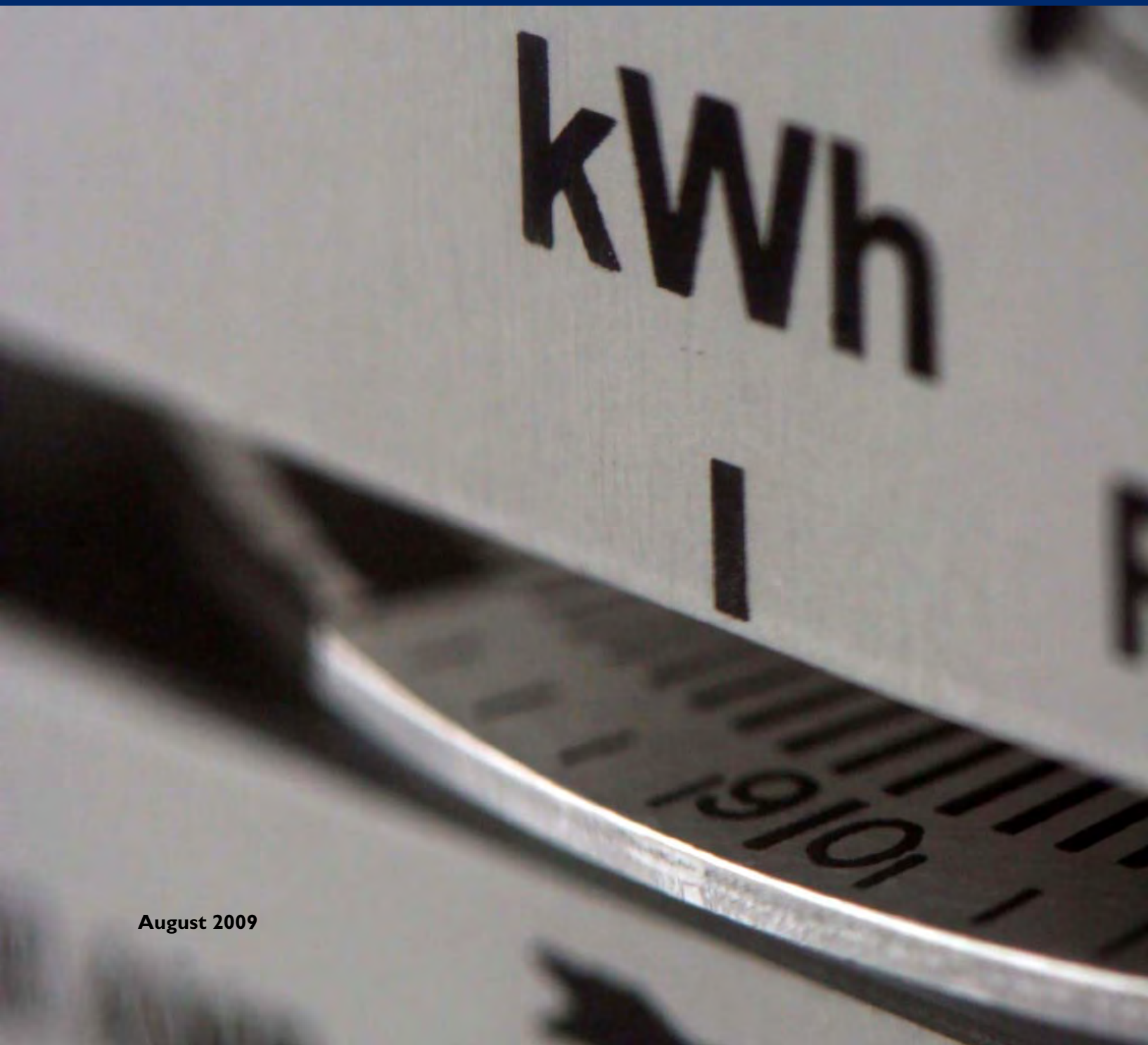
INNOVATIVE APPROACHES TO FINANCING ENERGY EFFICIENCY IN ASIA



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CONTENTS

ACRONYMS

AEL	Asian Electronics Limited
APP	Asia-Pacific Partnership on Clean Development and Climate
BEE	Bureau of Energy Efficiency
ECO-Asia CDCP	Environmental Cooperation-Asia Clean Development and Climate Program
DEDE	Department of Alternative Energy Development and Efficiency, Ministry of Energy, Thailand
DSM	demand side management
EE	energy efficiency
EERF	Energy Efficiency Revolving Fund
ESCO	energy service company
GJ	gigajoules
IREDA	Indian Renewable Energy Development Agency
KTOE	kilotons of oil equivalent
kWh	kilowatt hour
MW	megawatt
MSPPL	Mahendra Sponge & Power Private Limited
RDMA	Regional Development Mission for Asia
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States dollar
WHR	waste heat recovery

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OVERVIEW

The global economy steadily grew at an annual average rate of 4.1 percent from 2000 to 2008. Emerging and developing economies drove much of that increase, with a collective growth rate of 6.5 percent.[1] During this rapid period of growth, many Asian countries have focused their efforts on expanding production capacity quickly to meet their energy needs as opposed to focusing on ways to use energy more efficiently. In addition, governments at the state, local, and national levels have pursued the fastest and cheapest ways to develop infrastructure, with less emphasis on the long-term economic and environmental sustainability of their efforts.

The globe now faces a protracted economic downturn, with gross domestic product expected to slow down to 0.5 percent in 2009.[2] Asian businesses are facing the need to lower costs and remain competitive. Budget cuts are spurring governments to find new ways to reduce expenditures by making more effective use of energy. Energy costs represent a significant proportion of the cost of production of various goods and services utilized by industrial societies. Thus, improving energy efficiency and lowering energy demand is foremost among the options to lower costs and enhance competitiveness.

The total potential for energy efficiency investments in Asia is huge. For example, a recent study estimated the total investment potential for electricity efficiency in India alone to be upwards of US$6 billion (USAID, 2008).[3] Nevertheless, there remains a huge gap between energy efficiency potential and on-the-ground implementation. Several barriers continue to stymie efforts to finance large-scale energy efficiency in Asian countries. These include initial "buy-in" barriers, such as a higher perception of risk among traditional financial actors as well as a lack of understanding about how energy efficiency can boost the bottom lines of project developers. In addition, there are the "how to" barriers: a lack of standardized documents, inconsistent monitoring protocols, and disparate methods to measure actual energy savings.

In recent years, several innovative models for financing energy efficiency projects have been deployed across Asia. This report highlights two case studies from India and one from Thailand. Each of the case studies describes how an innovative approach was used to bring together financiers, technology providers, and project developers to break down the barriers mentioned above. This resulted in an increase in the overall availability of finance and uptake of improved technologies and best practices.

- The first case study examines Thailand's Energy Efficiency Revolving Fund (EERF), which is managed by the Department of Alternative Energy Development and Efficiency (DEDE). The EERF provides funds to prospective financial institutions at an interest rate of 0.5 percent. In turn, these financial institutions are allowed to "on-lend" these funds for energy efficiency projects at an interest rate of no more than 4 percent. Combined with technical assistance, DEDE's fund has served to successfully stimulate the banking community's interest in energy

[1] IMF, 2008.World Economic Outlook Database, October 2008. http://www.imf.org/external/pubs/ft/weo/2008/02/weodata/index.aspx
[2] IMF, 2009. World Economic Outlook Update. http://www.imf.org/external/pubs/ft/weo/2009/update/01/index.htm
[3] USAID, 2008. Financing Energy Efficiency in India

conservation and efficiency, resulting in loans worth a total of 10.1 billion baht (US$285.5 million), almost half of which was provided by the banks themselves. This has translated into energy savings of 750 million kWh per year.

- The second case study describes how Asian Electronics Limited (AEL) is working with municipal corporations in India to install energy efficient streetlights and upgrade central monitoring systems. Public-private partnerships between AEL and nine cities using energy service company (ESCO) contracts, and other projects that are currently underway will lead to energy savings of nearly 13 MW by 2010. These energy savings are shared with AEL through a pay-for-performance agreement, where each city makes energy efficiency improvements without having to provide the initial investment capital. With over 4,300 Indian cities operating inefficient street lighting systems, the ESCO approach is a financing mechanism that can provide broad win-win opportunities for municipalities and companies to use.

- The third case study showcases investments to convert waste heat into power within India's sponge iron industry, as an example of the innovative financing measures being pursued by the Indian Renewable Energy Development Agency (IREDA). While the sponge iron industry has a lot of potential for power generation through waste heat recovery during the manufacturing process (up to 500 MW of power a year), and a related annual CO_2 equivalent emissions reduction potential of over 1.5 million tons, financing was not forthcoming for these projects. IREDA has led a multi-lender consortium to identify, design, and finance dedicated projects aimed at generating power from such projects. Deploying a mixture of targeted lending, energy audits, capacity building, and outreach, IREDA continues to expand the possibilities for energy efficiency initiatives throughout India.

These case studies demonstrate that forward-thinking regulations, new financing mechanisms, and institutional frameworks can expand the market for energy efficiency investments and result in significant energy savings. Most importantly, the studies illustrate the considerable potential to scale up these innovative financing approaches.

CASE STUDY 1

THAILAND'S LOW INTEREST FUND SPARKS HIGH INTEREST IN SAVING ENERGY

Standing before a computer in his small office, Kosol Bunchuay points to a green horizontal line running across the top of the screen, "This shows the highest power demand of the day." Pointing to a squiggly moving line, the maintenance chief of Ramkhamhaeng Hospital in Bangkok pinpoints the real-time use of power. The computer is part of an air conditioning system installed nearly three years ago to replace a troublesome 19-year-old system.

"Before, we used to spend time running around checking on and often repairing air conditioners that acted up," said the maintenance chief. Sometimes an entire section had to be closed. Now only one of the crew makes the rounds a few times each day, checking the temperature in various sections of the elongated hospital building, and then making adjustments to the system at the computer. "It used to take four men to keep the system running. Now we need only two men, freeing the others to do other things."

"Low interest rates will make it easier for business operators to make the decision to invest."

–Associate Professor Dr. Bundit Limmeechokchai, Chairman of the Mechanical Engineering Program at Sirindhorn International Institute of Technology

Start date	January 2003
Agency	Department of Alternative Energy Development and Efficiency (DEDE)
Objective	To stimulate and leverage commercial investment to improve energy efficiency; To familiarize commercial banks with energy efficiency lending markets and opportunities.
Financing mechanism	DEDE's revolving fund provides low-interest loans to banks, which then finance energy efficiency projects through loans with favorable interest rates.
Government funds	Bt 5.41 billion (US$155 million)
Bank/own funds	Bt 4.73 billion (US$135 million)
Loans or projects	198 factories, 35 buildings, 4 ESCOs
Energy savings	758,147,666 kWh/yr 198,953,536 liters of oil/yr Total of 251.86 KTOE/yr
CO_2 reductions	1,041,824 metric tons CO_2 equivalent per year

ENERGY EFFICIENCY REVOLVING FUND

The investment of approximately US$428,000 in the new system was made possible by an energy conservation project that provides loans at a low interest rate. In 2003, the Department of Alternative Energy Development and Efficiency (DEDE) launched the Energy Efficiency Revolving Fund (EERF), aimed at stimulating the banking community's interest in lending to industry for energy conservation projects with minimal government intervention.

The EERF project comes under the Energy Conservation Promotion (ENCON) Fund, which is financed by a levy on petroleum products. EERF's mandate is to fund sustainable energy initiatives, incentives, and research and development. "The financial sector previously had no interest in energy-saving projects. They were more interested in financing expansion of manufacturing or new construction," said Dr. Prasert Sinsukprasert, Director of DEDE's Energy Regulation Division, who helped launch the fund.

In the initials phase of the EERF, DEDE provided funds to banks at zero interest on the condition that banks can charge their customers no more than 4 percent interest. Subsequently, DEDE decided to charge the banks 0.5 percent interest to cover administrative costs.

BANKING ON ENERGY EFFICIENCY INITIATIVES

Under conventional practices, small companies interested in improving energy efficiency (EE) would be hard-pressed to post sufficient collateral for loans. But as Thai banks become more familiar with EE projects, they may take into consideration a project's energy-saving potential. The potential to translate energy savings into profit makes it possible for smaller enterprises to meet their payments and proceed with EE projects.

Photo: ECO-Asia CDCP Staff

Energy efficient motor and pump installed at Ramkhamhaeng Hospital

Wirongrong Sukying, Executive Vice President at CIMB Thai Plc., sees the possibility that Thai banks could soon consider EE loans "project financing" rather than "corporate lending." While corporate lending favors large, financially strong companies, project financing favors well-planned, technically-sound projects, which can be undertaken by small- and medium-sized enterprises without collateral guarantees.

Wirongrong is enthusiastic about the potential of EERF to help expand the client base of commercial banks. She expects oil prices, which have recently experienced sharp drops, to eventually climb back up, prompting business operators to increase energy efficiency in order to shore up profits.

One of the factors that convinced her to get closely involved with the project was the commitment, pragmatism, and support of government officials. This has helped establish trust, which strengthened the relationship between banks and government agencies, according to Wirongrong. "We are fortunate that

the government people we have been working with are practical people…not theorists or sticklers for the rules."

Technical support from DEDE helps give banks the confidence needed to consider EE projects, even without technical or engineering staff of their own. Wirongrong said DEDE played a key role in educating clients about energy efficiency. "Banks don't have technical knowledge. We're not engineers. But DEDE provides continual support and that helps sustain our operation," she said.

LOANS LEAD TO ENERGY SAVINGS

Since EERF was launched, she said, CIMB Thai has lent about 800 million baht (nearly US$23 million) from the fund and 2 billion baht from its own resources. While interest was capped at 4 percent for loans from the fund, she said the bank charged a higher rate for the capital it put in, normally at the minimum lending rate minus 1 percent, which usually comes to about 6 percent or 7 percent. By blending the DEDE funds with their own funding sources, the banks are able to offer a combined loan interest rate that is substantially below the prevailing market rate.

According to DEDE, as of October 2008, 198 factories, 35 buildings, and 4 energy service companies are implementing projects, with a combined total investment of more than 10.1 billion baht. Of this amount, the loans approved under EERF amounted to 5.4 billion baht. This resulted in electricity savings of more than 750 million kWh per year, or nearly 200 million liters of oil per year.

DEDE'S EE REVOLVING FUND

Loan period: Maximum 7 years

Loan channel: Commercial banks

Eligible borrowers: Buildings, factories, and energy service companies

Eligible investment: Equipment and installation; consultancy fees; civil works, piping, and necessary components; associated costs, such as removal of existing equipment, transportation, taxes

Loan size: Maximum 50 million baht (approx. US$1.4 million) per project

Interest rate: 4 percent per year or less

Eligible projects: Energy conservation or energy-saving projects

Number of projects approved: 198 factories, 35 buildings, 4 ESCOs

Source: Department of Alternative Energy Development and Efficiency (DEDE) (Exchange rate as of Oct 2008: 35 baht/USD)

Ramkhamhaeng Hospital was one of the first to jump at the opportunity. Bandit Ngamwatthanasilp, Managing Director of Innovation Technology, an energy consulting firm, said Ramkhamhaeng took out the loan in 2006 to install 210 split-type air conditioners, a computerized control system, and energy-saving lighting. It is expected to recoup the investment within four years. In the process, he added, the hospital has gained increased productivity and quality of service, and reduced cost and risks.

Energy policy analysts are generally positive about the objectives of EERF to create a public-private partnership to boost energy efficiency in industry. Installing energy efficiency technology requires large investments. If the return on investment takes too long, companies are not interested, explained Associate Professor Dr. Bundit Limmeechokchai, Chairman of the Mechanical Engineering Program at Sirindhorn International Institute of Technology. "Low interest rates will make it easier for business operators to make the decision to invest," Dr. Bundit said.

FUTURE OF EE FUNDS

Dr. Bundit and other experts suggest that the fund be sustained for the long term to maintain the momentum of energy efficiency improvement in industry. Without a fund to offer financial incentives, they fear that business operators will keep postponing project implementation to the detriment of the country's energy-saving policy.

Dr. Prasert, however, said that the revolving fund project has succeeded in its objectives and it will eventually come to an end. "Banks have the money to lend. DEDE will offer other types of assistance, such as awareness building and technical support."

Meanwhile, DEDE has initiated another project to fill the void when EERF is phased out. The agency has setup a new fund for ESCOs with 500 million baht to serve the needs of small- and medium-sized enterprises in the energy conservation sector. For this project, DEDE will take full control and administer the fund itself. The department will make equity investments in SMEs interested in energy efficiency projects. It expects to recoup its investment plus dividends from the energy savings derived from the projects. Dr. Prasert said the new fund will supplement the existing revolving fund.

It appears that one successful project is breeding another. Together, these projects represent a paradigm shift in the role of government agencies away from that of enforcer and regulator to facilitator and supporter.

CASE STUDY 2

STREET LIGHT SAVINGS BOOST FORTUNES OF INDIAN CITIES

As Ashok Sharma describes the contours of the newly set up central control room for the Energy Efficient Municipal Street Lighting project at Ajmer, Rajasthan, he extols the virtues of his approach to energy efficiency. "Lighting is the easiest to understand, quickest to retrofit, and savings are instantaneous, visible, and verifiable," remarks Sharma, CEO, Lighting Division, Asian Electronics Ltd. (AEL).

AEL has set up similar control rooms with an array of computer-controlled monitoring systems in eight other Indian cities, including Indore, Ujjain, Latur, Akola, Amritsar, Alwar, Bikaner, and Hissar. The control rooms, which were established under Energy Service Company (ESCO) contracts for municipalities under a public-private partnership, monitor citywide street lighting systems.

A main street in Amritsar with energy efficient lighting

"The verified savings in the first few months have been more than the contracted savings. It's a win-win situation for everyone."

– V.L. Soni, Executive Engineer, Ajmer Electricity Ltd

Start date	2003
Agency	Asian Electronics Ltd. (AEL)
Objective	To design, manufacture and market energy efficient products, specializing in lighting solutions
Financing mechanism	The total project cost is funded by the ESCO. Energy savings are shared between the ESCO and the municipal corporation under a "pay for performance" agreement.
Government funds	n/a
Bank/own funds	Rs. 1.4 billion (US$31.1 million)
Projects	13
Energy savings	47 million kWh/yr (13 MW of capacity avoided)
CO_2 reductions	40,000 metric tons CO_2 equivalent per year

THE CHALLENGE

Nearly 300 million people live in more than 4,300 Indian cities and towns with a cumulative street lighting connected load of approximately 4,400 MW. Each year, street lights consume an estimated 21 billion kWh[4] of energy, emitting 15.56 million tons of CO_2. The current street lighting technology is inefficient and introducing more efficient street lamps could save up to 6.1 billion kWh and reduce 4.1 million tons of CO_2 per year. Tapping these energy savings presents a huge business opportunity for the lighting industry and a challenge for municipalities to become more energy efficient.

BARRIERS TO EE FINANCING

Starting with nine cities, AEL drew on successful examples in developed countries to address barriers to enter the ESCO business, an uncharted territory in the Indian context. General barriers included the lack of standard tender documents, monitoring and verification protocols, and technical competencies among municipal staff. There were also difficulties in establishing energy baselines in order to assess potential savings that could result from the projects. Municipalities, with their present poor financial situation, face numerous constraints in undertaking capital expenditures for modernization and energy efficiency. AEL's first challenge, therefore, was to convince the municipalities that the ESCO model would be financially advantageous to them.

Energy efficient street lighting in Indore

THE ESCO APPROACH TO STREET LIGHTING

The most attractive feature of any street lighting ESCO project is that municipal corporations are not required to make start-up investments. As the ESCO, AEL estimated the baseline consumption for street lighting (which was verified by the city and electricity utility) as well as the potential energy savings. AEL then financed the initial capital expenditure, which has been a boon for the municipalities since it avoided capital expenditures while enabling investments in energy efficiency technology, retrofitting, and maintenance. The ESCO model is based on a "pay for performance" concept, where AEL's products generate demonstrable cost savings for the city, a percentage of which are then shared with AEL.

Once the partnership is launched, the first step is to retrofit mercury vapor lamps with energy efficient sodium vapor or metal halide lamps. Controls and monitoring have been crucial for the projects' success—load management has improved significantly through energy saving software in central control rooms. Control boxes are remotely operated and information regarding switched off lights and energy readings are monitored. This ensures guaranteed lighting hours and better time allocations for repairs and maintenance. A monitoring and verification protocol, agreed with municipalities, requires monitoring after installation is completed to verify the energy savings. The energy savings are then monetized at rates fixed by the utility.

[4] TERI, 2004. Energy Efficiency in Municipal Water Pumping and Street Lighting: A potential candidate for CDM? www.iges.or.jp/en/cdm/india/activity03/hari2.pdf

BRIGHT RESULTS

Since its first projects in 2003, AEL has been a pioneer in improving energy efficiency in street lighting. It is one of the few ESCOs registered with India's Bureau of Energy Efficiency (BEE), the national agency mandated to promote energy efficiency measures under the *Energy Conservation Act, 2001*.[5] AEL's street lighting projects have helped install more than 25,000 waterproof energy efficient tubelights and 100,000 retrofit energy efficient tubelights, which are controlled by 4,000 automatic load monitoring systems at all switching points. These projects and additional ones that are underway will lead to energy savings of nearly 13 MW and carbon savings of approximately 40,000 tons of CO_2 equivalent per year. The projects have achieved energy consumption savings of up to 60 percent. Soni, Executive Engineer of Ajmer Electricity, who supervised the retrofit implementation at Ajmer said, "The verified savings in the first few months have been more than the contracted savings. It's a win-win situation for everyone."

There has been satisfaction all around as bills are reduced, the load on the utility is down, and there are savings. AEL has successfully convinced urban administrators of the multiple benefits of converting to energy efficient street lighting through the ESCO route. Jagdish Chaudhury, Commissioner of the city of Ajmer in Rajasthan said, "The impact of the partnership is immediate and stakeholders have responded positively to AEL's initiatives." With streetlight maintenance in the hands of the ESCO, M.P.S. Bedi, Executive Engineer of the city of Amritsar in Punjab, reports that there has been a remarkable drop in citizens' complaints. In Indore, AEL established a helpline for citizens to report malfunctioning streetlights.

EXPANDING ESCO OPPORTUNITIES

Buoyed by these accomplishments and to address new business opportunities, AEL's ESCO Division has decided to increase its share in the conglomerate's lighting manufacturing business. Apart from the street lighting projects in nine cities across India, AEL has also bid for similar contracts in 25 other Indian cities. The company's outlook for its ESCO operations appear robust, growing from revenues of Rs. 100 million (US$2.2 million) in 2005-06 to Rs. 600 million (US$3.3 million)[6] in 2007-08.

Innovative financial engineering models like the ESCO, which has led to demonstrated verifiable energy savings and greenhouse gas emissions reductions, are gaining acceptance among urban development authorities and city planners. A number of energy efficiency projects are being conceived and implemented using ESCOs under the Government of India's flagship urban development program, the Jawaharlal Nehru National Urban Renewal Mission. Municipal authorities and electricity utilities are slowly but surely gaining conviction that ESCOs can help relieve the resource crunch cities are facing in implementing energy efficient lighting. AEL and similar ESCOs have demonstrated that public-private partnerships can be tapped to capitalize on technological, business, and financial innovations to match the needs of municipalities, while improving the quality of life for the urban citizenry.

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[5] The Government of India passed the Energy Conservation (EC) Act, 2001 to facilitate and enforce the efficient use of energy and its conservation. The Act has created a favorable environment for driving energy conservation and energy efficiency across a wide range of industrial and commercial sectors. The Bureau of Energy Efficiency is mandated to direct and monitor the implementation of the EC Act 2001, to promote energy conservation and efficiency through its action plans. According to the Asian Development Bank, the overall energy efficiency investment market under the ESCO system of performance contracts in India is Rs. 140 billion (US$3.1 billion) and has the potential to save about 54 billion kWh annually.

[6] Exchange rate as of October 2008: US$1 = Rs. 45

CASE STUDY 3

INDIA HELPS IRON MAKERS SPONGE-UP ENERGY AND PROFITS

When Mahendra Sponge & Power Private Limited (MSPPL) proposed an 8 MW plant to generate power from waste heat released from its two sponge iron kilns, it faced many barriers and had few financial instruments at its disposal to implement the energy efficiency (EE) project. With support from the Indian Renewable Energy Development Agency (IREDA), MSPPL established the first captive power plant basedon waste heat recovery (WHR) in Siltara, Raipur, in 2003. Since then, the WHR plant has provided the company's entire power requirement for its sponge iron plant and the other units producing commercial steel products. As an added benefit, 3 MW of surplus power is sold under a power purchase agreement to the Chhattisgarh State Electricity Board at Rs. 3.30 per kWh.

Photo by IREDA

Mahendra Sponge & Power Ltd. sponge iron plant

"There is a potential of producing about 500 MW of power through waste heat removal units with an annual carbon credit of 1.5 million certified emission reductions."

– Lakshman Prasad, sponge iron unit advisor

Start date	1998
Agency	Indian Renewable Energy Development Agency (IREDA)
Objective	To promote, develop, and extend financial assistance for renewable energy and energy efficiency/conservation projects with the motto "Energy Forever"
Financing mechanism	IREDA uses its own funds, in combination with those from other sources, to act as a dedicated financing institution for end-user energy efficiency retrofits, utilities' DSM projects, and ESCO projects.
Total investments	Rs. 7.15 billion (US$159 million)
Loan component	Rs. 3.51 billion (US$78 million)
Loans or projects	13
Energy savings	249 million kWh 21.22 KTOE
CO_2 reductions	201,690 metric tons of CO_2 equivalent per year

HARNESSING WASTED ENERGY IN THE SPONGE IRON INDUSTRY

In the last decade, India has emerged as the world's largest producer of sponge iron,[7] accounting for 20 percent of global output. According to the Ministry of Steel's Joint Plant Committee, there were more than 250 sponge iron plants in India producing close to 20 million tons in 2007-2008. In addition, 225 plants are under commission and 77 are undergoing capacity expansions. Sponge iron units are mostly located in the eastern mineral-rich belt, where essential raw materials—iron ore and non-coking coal—are easily sourced.

Photo: IREDA, New Delhi

Waste heat recovery boiler

The existing production processes in India for sponge iron are inefficient and have been identified by experts as offering immense potential for EE improvements. Power and fuel comprise as much as 12.8 percent of the total costs in India's sponge iron industry. The Bureau of Energy Efficiency (BEE), which is the leading body of the Government of India to promote energy conservation and energy efficiency across different sectors, has set the target for specific energy consumption by sponge iron plants at 70 kWh of electricity per ton. However, the majority of sponge iron manufacturers in India have a specific energy consumption ranging from 90-130 kWh per ton, thus indicating significant potential for energy savings. The potential for using waste heat more efficiently in these units is an area of particular relevance.

BARRIERS TO EE FINANCING

Before realizing this opportunity however, EE projects must overcome several barriers in financing. Key among them is the perception of higher risk since improving energy efficiency does not bring any direct revenue streams, and the absence of performance guarantees from EE equipment suppliers. Financial institutions equate lending to EE projects similar to project term lending, which makes it difficult to secure financing.

According to N.R. Singh, Technical Services Manager of IREDA's Energy Efficiency Group, "Lenders have difficulties evaluating projects that have the 'potential' to enhance the financial bottom line. Understanding how energy efficiency contributes to profits requires a new way of thinking. On the technology front, some bankers do not have the technical expertise to evaluate an EE project and may possibly assign a higher risk rating to some very profitable projects."

IREDA'S EE FINANCING GENERATES POWER AND PROFITS

IREDA was established in 1996 with the aim of financing renewable energy projects. In recent years it has decided to expand its scope to include energy efficiency as well. IREDA's Chairman and Managing Director Debashish Majumdar said, "The response was encouraging. Our outreach and industry networking efforts have resulted in as many as 46 EE project proposals for financing."

[7]Sponge iron, also known as direct reduced iron, is created when iron ore is reduced to metallic iron, usually with some kind of carbon, such as charcoal, at temperatures below the melting point of iron. Sponge iron is an alternative to steel scrap as a raw material for the manufacture of various steel products.

IREDA chose to focus on the sponge iron sector because energy efficiency initiatives have a positive impact on profits and the energy savings could be significant. At the time in 2001, few sponge iron units had set up WHR units to produce power. Orissa Sponge Iron Ltd. was one of the first sponge iron plant funded jointly by IREDA and other financial institutions. With its reduced electricity costs and additional revenues from the sale of surplus power, the company achieved a quick financial turnaround and was soon seeing profits. Since then, over 30 WHR projects have been initiated. MSPPL is expected to generate around 21,000 tons of CO_2 equivalent emissions reductions per year, which can be sold in various carbon markets. MSPPL has become the trendsetter in the Raipur industrial area, and its project has set the benchmarks for establishing WHR boiler-based power plants. The success of MSPPL in running this plant inspired four other sponge iron units to install captive power plants.

In addition to WHR projects in the sponge iron industry, IREDA has since supported several other EE projects. In 2001, a line of credit from the World Bank helped IREDA to promote and finance the delivery of energy efficiency services and equipment, implementation of demand side management (DSM) schemes, and the development of energy service companies (ESCOs). Using the line of credit, IREDA financed the successful commissioning of twelve EE and DSM projects, with total investments exceeding US$65 million. The estimated annual energy savings for these projects is 249 million kWh.

FUTURE FINANCING

Going forward, IREDA now wants to work as a one-stop shop for EE and conservation financing to support WHR-based power at sponge iron units, while also financing energy efficient equipment in sugar mills, cement plants, and other industries. IREDA also subsidizes energy audits of companies seeking financing for EE projects. "IREDA has allocated 7.4 billion rupees (US$164 million) in the current Five-Year Plan (2007-2012) for funding energy efficiency projects and proposes to invest 600 million rupees (US$13.3 million) in clean energy projects in the sponge iron sector," said Majumdar.

Giving his assessment of India's overall sponge iron industry, Lakshman Prasad said, "There is a potential of producing about 500 MW power through WHR units with an estimated annual carbon emission reduction of 1.5 million tons." Clearly, the need for EE financing cannot be addressed by one agency alone. Therefore IREDA is also assisting five Indian banks—State Bank of India, Canara Bank, Union Bank of India, Bank of India, and Bank of Baroda—to formulate schemes for EE lending to small and medium enterprises. The agency is also in the process of extending special lines of credit to state electricity boards to implement projects to renovate and modernize thermal power stations.

IREDA's outreach activities, capacity building, and training initiatives have resulted in a greater understanding of the importance of EE financing and the type and size of projects that successfully result in energy savings. As Majumdar said, "There has been growing awareness and a number of entrepreneurs are showing considerable interest in setting up energy efficiency and conservation projects in their existing industries while also setting up new ventures."

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