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ESTABLISHMENT OF THE KERALA STATE ENERGY CONSERVATION FUND

NOVEMBER 2008

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ESTABLISHMENT OF THE KERALA STATE ENERGY CONSERVATION FUND

Report Prepared for
Energy Management Centre
Department of Power, Kerala

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ACRONYMS

ADB	Asian Development Bank	KITCO	Kerala Industrial Technical Consultancy Organization
APP-CDC	Asia-Pacific Partnership on Clean Development and Climate	KMML	Kerala Minerals and Metals Ltd.
BEE	Bureau of Energy Efficiency	KSEB	Kerala State Electricity Board
BMS	Building Management System	KSECF	Kerala State Energy Conservation Fund
CDCP	Clean Development and Climate Program	KSIDC	Kerala State Industrial Development Corporation
ckm	Circuit kilometers	KSPC	Kerala State Productivity Council
CMD	Contract Maximum Demand	kW	Kilowatt
DOP	Department of Power	kWh	Kilowatt-hour
DPR	Detailed Project Report	MTOE	Million Tons Oil Equivalent
DSM	Demand Side Management	MU	Million Units
EC	Energy Conservation	MW	Megawatt
ECF	Energy Conservation Fund	N/A	Not Applicable
EE	Energy Efficiency	NGOs	Non-Government Organizations
ESCOs	Energy Service Companies	NYSERDA	New York State Energy Research and Development Authority
FIs	Financial Institutions	PSUs	Public Sector Undertakings
GOK	Government of Kerala	SBI	State Bank of India
HLL	Hindustan Latex Ltd	TMAS	Temperature Monitoring and Alerting System
HNL	Hindustan Newsprint Limited	UNIDO	United Nations Industrial Development Organization
HP	Horse-power	US	United States
IFC	International Finance Corporation	USAID	United States Agency for International Development
IREDA	Indian Renewable Energy Development Agency	VFD	Variable Frequency Drives
KCMMF	Kerala Co-operative Milk Marketing Federation	WB	World Bank
KINFRA	Kerala Industrial Infrastructure Development Corporation		

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EXECUTIVE SUMMARY

INTRODUCTION

The Energy Conservation Act, 2001 (EC Act) provides the Central Government, State Governments and the newly established Bureau of Energy Efficiency (BEE) with certain powers and functions. One of the key elements of the Act is the mandatory requirement for the establishment of a designated agency “to coordinate, regulate and enforce provisions of this Act within the State.” Further, the Act specifies that “The State Government shall constitute a fund to be called the State Energy Conservation Fund for the purposes of promotion of efficient use of energy and its conservation within the state.”

The Government of Kerala has designated the Energy Management Centre (EMC) as the nodal agency to meet the requirements of the EC Act, 2001. The USAID ECO-Asia Clean Development and Climate Program (CDCP), with financial support from the Asia-Pacific Partnership on Clean Development and Climate, entered into a partnership agreement with the EMC, Department of Power, Government of Kerala, to support the State in its efforts to create the Kerala State Energy Conservation Fund (KSECF).

RATIONALE FOR KSECF

The opportunity for energy savings in Kerala is considerable, but the actual savings to date fall far below its potential due to a number of barriers. Many of these barriers are financial, and to overcome these the KSECF will need to:

- Facilitate increased implementation of Energy Conservation (EC)¹ projects by large energy users;
- Engage commercial financial institutions to participate in EC project financing;
- Facilitate Energy Service Company (ESCO) industry development and participation in EC project implementation;
- Demonstrate leadership in EC through implementation of EC projects in public buildings;
- Alleviate the power shortage and related impacts on the state economy; and
- Meet the mandated requirements of the EC Act, 2001.

OBJECTIVES AND SCOPE OF KSECF

The objectives and scope of the KSECF are summarized below:

- Support the financing of specific EC projects using a variety of options;
- Contribute to the development of the Energy Efficiency (EE) market in Kerala by financing projects with private sector implementation through energy service delivery organizations;
- Develop and demonstrate model financial transactions;
- Develop typical financing agreements that can be used by the private sector;
- Build the capacity of local financial institutions to increase their knowledge, interest, and capability for financing EE projects; and
- Leverage commercial funds and create a sustainable market for EC project financing.

The KSECF shall provide financing for all energy consuming sectors, including industrial, small and medium enterprises, commercial, domestic, street lighting, and agriculture sectors. Financing will depend on the risk

1. The terms energy conservation and energy efficiency have been used interchangeably throughout the report

profile and viability of the project, as well as potential for replication across the state.

FUND ESTABLISHMENT

The Government of Kerala (GOK) could establish the KSECF initially within the EMC to meet the legislative directives of the EC Act, 2001.

FUND SIZE

Initially the GOK could provide funding of Rs. 50 lakhs to one crore¹ from the Department of Power budget to establish the KSECF by January 1, 2009. A request should then be made to the Bureau of Energy efficiency for matching funds to double the size of the KSECF. Subsequently, the fund size could be expanded to about one to two percent of electricity sales revenues.

OTHER FUNDING SOURCES

Once the initial Fund has been established, the GOK could identify and solicit funds from other sources to increase the size of the Fund. One potential source of funding is the Kerala Electricity Surcharge Fund. Other sources that could be considered include budget allocations through special legislation starting with fiscal year 2009-2010, additional funds from the BEE, donor agencies, commercial financial institutions, and international financial institutions, including the Asian Development Bank and the International Finance Corporation. Funds from carbon markets (using the Clean Development Mechanism or voluntary markets) could also be included.

MANAGEMENT AND GOVERNANCE

Initially the KSECF could be managed by the EMC under the direction of its existing Board of Directors. As the Fund size expands, a professional financial manager could be identified and selected using a competitive process. Once a professional manager is selected, the GOK could appoint a new Board of Directors for KSECF composed of:

- Secretary, Department of Power - Chairman
- Representative of the Bureau of Energy Efficiency
- Secretary, Department of Finance
- Secretary, Department of Industries and Commerce
- Secretary, Department of Local Self-Government
- Director, BPE Department
- Two representatives from industry associations and chambers of commerce
- Two representatives who are well versed in technical and financial aspects of EE project implementation
- Representatives of financial institutions (when they contribute to the SECF)
- Director, EMC - Member Secretary

FINANCING MECHANISMS

Initially, the KSECF could implement the following financing mechanisms:

- Subsidies for energy audits
- Low-interest loans or interest buy-down
- Financing for public building EC projects

1. This translates to 100,000 - 200,000 USD at current exchange rates (50 Rupees = 1 USD)

- Credit guarantees or risk guarantees to facilitate commercial financing of EC projects by reducing perceived project risks

Other financing mechanisms could be developed in the second year of operations, including specially designed grants for public interest projects, equity investments, or co-investments with commercial financial institutions.

ESTABLISHING PROJECT SELECTION CRITERIA

KSECF could develop and establish a set of criteria for selecting the initial projects to be funded. Examples include the following:

- The project must be technically feasible
- The project must meet environmental standards
- The project must be economically and financially sound
- The risks of the project should be manageable
- The project must be replicable in the state of Kerala
- The implementation of the project should contribute to the development of sustainable EE markets
- The project must be supported by an appropriate detailed project report (DPR), such as an investment grade energy audit prepared by an accredited energy auditor

ENCOURAGING ESCO ACTIVITIES

The KSECF could also promote the entry, establishment, and development of ESCOs and other energy services providers in Kerala. Measures undertaken to accomplish this objective include:

- Transmitting a clear signal to existing Indian and foreign ESCOs that the KSECF will provide funding for EC projects implemented by ESCOs;
- Developing and implementing procedures for public agency EC projects that employ the performance contracting mechanism;
- Working with local Financial Institutions (FIs) to promote and encourage their contributions to ESCO projects;
- Providing attractive financing for ESCO projects; and
- Considering equity financing or establishing an equity fund for ESCOs.

TRAINING AND CAPACITY BUILDING

KSECF should work closely with EMC to develop and implement capacity building activities for energy users, energy managers, ESCOs or other energy service providers, and financial institutions. KSECF could leverage its funding from donor agencies and the BEE for this purpose.

DEVELOPMENT OF INITIAL PIPELINE OF PROJECTS

The KSECF should initiate activities to identify and develop an initial set of projects to be underwritten by the Fund. These initial projects could be selected using the criteria developed by the KSECF, as discussed above.

IMMEDIATE NEXT STEPS

The following are the recommended immediate next steps:

ACTIVITY	RECOMMENDED DATE
Approve initial budget allocation from the Department of Power (DOP)	November 30, 2008
Apply for matching funds from BEE	December 31, 2008
Issue orders for the KSECF, including institutional and management directives	December 31, 2008
Make the KSECF operational	January 1, 2009
Formally launch the KSECF and conduct Second Stakeholder Roundtable	January 15, 2009
Modify the KSECF structure, if needed, based on the Roundtable; define and approve project schemes for support	February 28, 2009
Develop and approve detailed KSECF rules, regulations, and procedures	March 31, 2009
Initiate project support	April 1, 2009
Start implementing projects	June 30, 2009

SECTION I

INTRODUCTION

1.1 BACKGROUND

In late 2007, the USAID ECO-Asia Clean Development and Climate Program (ECO-Asia CDCP) received funds from the Asia-Pacific Partnership on Clean Development and Climate (APP-CDC) to support a set of India-specific technical assistance programs. Under this funding, the Program initiated support for the creation and implementation of a State Energy Conservation Fund. India's national Energy Conservation Act of 2001 requires Indian states to establish energy conservation funds to facilitate implementation of energy efficiency projects. While many states have considered the establishment of such funds, none have been created till date.

In May 2008, the ECO-Asia CDCP entered into a partnership with the Energy Management Centre (EMC), Department of Power (DOP), Government of Kerala (GOK), to support the State in its efforts to create the KSECF.

1.2 OBJECTIVES OF THE PARTNERSHIP

The major activities of the partnership between the EMC and ECO-Asia CDCP related to the establishment of the KSECF are:

- Assessment of market potential and priority sectors for energy efficiency investments;
- Development of options for financial structuring, fund management, and administration;
- Criteria for selection of investment opportunities and projects;
- Design of the KSECF;
- Preliminary development of a pipeline of investment projects.

This Draft Report presents the initial design of the KSECF and outlines the proposed objectives, structure, potential size, funding sources, project financing mechanisms, and a framework for management and governance.

1.3 NEED FOR ENERGY CONSERVATION IN KERALA

With the enormous increase in world energy prices, the economy of Kerala is struggling to cope with staggering increases in production costs. Simultaneously, due to limited new generation capacity additions and low rainfall, Kerala is suffering from severe and chronic power shortages. The Kerala State Electricity Board (KSEB) has proposed a thermal surcharge on High Tension and Extra-High Tension customers to reduce electricity demands and alleviate power shortages. This surcharge will expectedly have further detrimental effects on Kerala's industry.

Energy conservation (EC) has been widely acclaimed as the most cost-effective way to mitigate power shortages. The Kerala government recognized the need for EE improvements in the state and thus established the Energy Management Centre (EMC) in 1996. The EMC has been engaged in many energy conservation activities in order to:

- Reduce energy consumption and costs to energy users;

1. The terms energy conservation and energy efficiency have been used interchangeably throughout the report

- Reduce need for expensive new generation capacity;
- Reduce fiscal impact on the government budget;
- Provide significant economic benefits to customers; and
- Create positive environmental benefits at the local, national, and global levels.

However, despite the efforts of EMC, the implementation of EC projects are few and far between and even highly viable projects are not being implemented. One of the key barriers limiting the implementation of EC projects is the availability of financing. The major financing barriers identified in Kerala are:

- The relatively small size of EC projects make them less attractive for conventional bank financing
- The concept of “project financing” has not been widely accepted for EC projects
- Conventional lenders do not have sufficient knowledge and understanding of EC technologies, and their economic and financial characteristics
- Financial institutions may perceive EC projects as being more risky than alternative projects
- The transaction costs for EC projects are relatively high
- EC projects have a relatively high proportion of “soft costs”¹

1.4 THE NEED FOR AN ENERGY CONSERVATION FUND

Kerala is required to comply with the Energy Conservation Act, 2001 (EC Act). The EC Act is the most important legislative initiative related to energy efficiency in India’s history. Its purpose is to “provide for efficient use of energy and its conservation and for matters connected therewith or incidental thereto.” The Act provides the Central Government, State Governments, and the newly established Bureau of Energy Efficiency with certain powers and functions.

One of the key elements of the Act is the mandatory requirement for the establishment of a designated agency “to coordinate, regulate and enforce provisions of this Act within the State.” The Act further specifies that:

- “The State Government shall constitute a fund to be called the State Energy Conservation Fund for the purposes of promotion of efficient use of energy and its conservation within the state.
- To the fund shall be credited all grants and loans that may be made by the state government or Central Government or any other organisation or individual for the purposes of this act.
- The fund shall be applied for meeting the expenses incurred for implementing the provisions of this act.
- The fund... shall be administered by such persons or any authority and in such manner as may be specified in the rules made by the state government.”

In response to these requirements Kerala has nominated the EMC as the designated agency for compliance with the EC Act. EMC has developed the preliminary structure of the Kerala State Energy Conservation Fund (KSECF) and drafted the rules for the KSECF.

1. Soft costs are expenses that are incurred in association with a project but are not construction costs. Examples include financing and legal fees

SECTION 2

KERALA POWER SITUATION

2.1 ELECTRICITY CONSUMPTION IN KERALA

The majority of energy in Kerala is consumed by households, which represent about 79 percent of all energy users and 46 percent of the total electricity use. However, large industrial users, representing only 0.02 percent of customers, consume 30.8 percent of the electricity. **Table 2-2** provides the information on electricity use by sector:

Table 2-1 provides details on the Kerala Power System. Overall power demand is on the upswing and the existing power system is experiencing difficulties meeting increased demands.

TABLE 2-1: KERALA POWER SYSTEM AT A GLANCE (2007)

Installed capacity MW	2,657
Maximum demand MW	2,742
Generation MU	7,745
Import MU	8,149
Export MU	1,046
Energy sales MU	11,331
Per capita consumption- kWh	465
No. of consumers (in lakhs)	87
Connected load -MW	11,465
Sale of power (Rs. crores)	4,009

Source: <http://www.expert-eyes.org/glance.html>

Note: megawatt (MW), million units (MU), lakhs = 100,000, crores = 10 million

TABLE 2-2: ELECTRICITY CONSUMPTION IN KERALA

Category	Number of Consumers (as of 3/31/2007)	Percentage of total consumers (%)	Consumption (Million Units - M kWh)	Percentage of total consumption (%)
Domestic	6,880,500	78.96	5,213.15	46.01
LT Commercial	1,270,932	14.59	1,245.80	10.99
LT Industrial	122,308	1.40	933.93	8.24
LT Others	437,998	5.03	448.98	3.96
HT & EHT	2,132	0.02	3,489.14	30.79
Total	8713,870	100.00	11,331.00	100.00

Source: Aggregate revenue requirement statement 2007-08, filed before Kerala State Electricity Regulatory commission by KSEB.

Note: low tension (LT), high tension (HT), extra high tension (EHT)

2.2 SUPPLY-DEMAND BALANCE

An illustration of the supply-demand balance is provided in **Table 2-3**. The period from April to October 2008 saw an average energy deficit of about 11.5 percent, which climbed to 16.3 percent in October 2008.

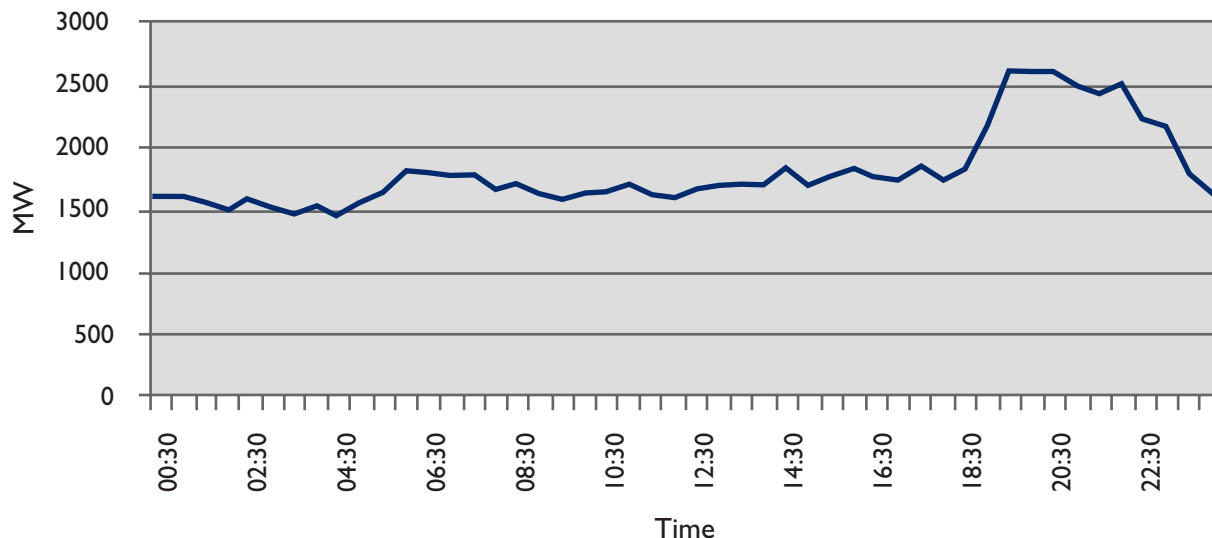
TABLE 2-3: SUPPLY DEMAND BALANCE FOR KERALA (APRIL - OCTOBER 2008)

October 2008 (in MUs)				April- October 2008 (in MUs)			
Requirement	Availability	Deficit	(%)	Requirement	Availability	Deficit	(%)
1,512	1,265	-247	16.3	10,185	9,010	-1,175	-11.5

Source: http://cea.nic.in/god/gmd/Monthly_Power_Supply_position/Energy_2008_10.pdf

The typical hourly load shape for the Kerala Power System is shown in **Figure 2-1**.

FIGURE 2-1: LOAD SHAPE - KERALA POWER SYSTEM

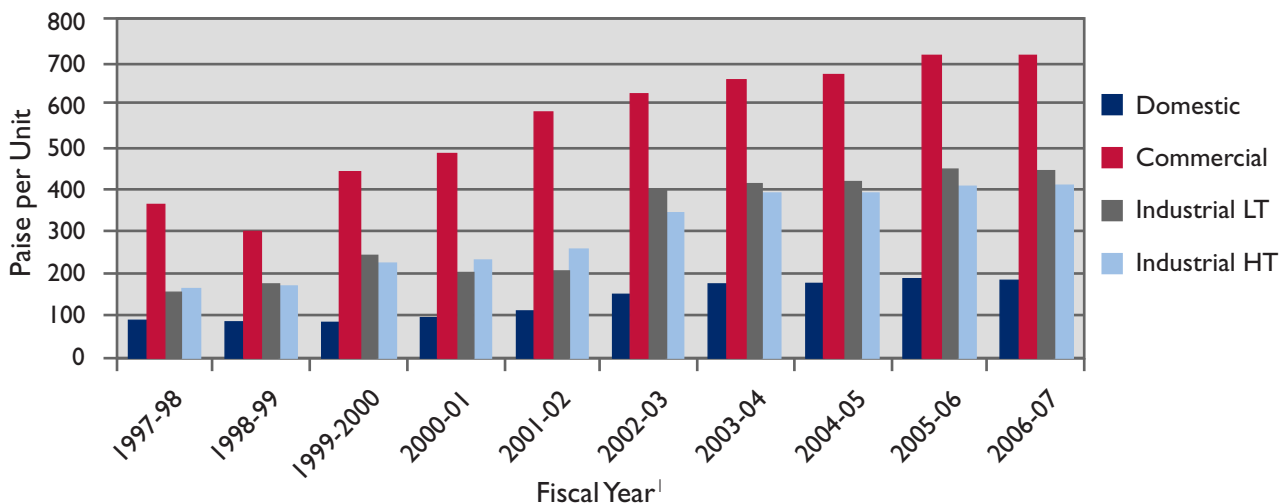


Source: Presentation by Dr: K.M. Dhariesan UNNITHAN, DIRECTOR, EMC-KERALA at a July 2008 workshop on Establishing a State Energy Conservation Fund in Kerala, Thiruvananthapuram. This workshop was organized by the USAID ECO-Asia Clean Development and Climate Program.

2.3 TARIFFS

Due to the increasing demands on the power system and the increasing cost of power supply, prices have been increasing, as shown in Figure 2-2.

FIGURE 2-2: ELECTRICITY TARIFFS (1997 - 2007)



Source: Kerala State Electricity Board

These characteristics of the power system highlight the need to reduce power demand through energy conservation.

1. The Indian Fiscal Year runs from April to March

SECTION 3

ENERGY CONSERVATION ACTIVITIES IN KERALA

3.1 THE ENERGY MANAGEMENT CENTRE

EMC is an autonomous body under the DOP, GOK, tasked with improving energy efficiency by promoting the development energy efficient technologies, programs, and investments, through research, training, demonstration programmes, and public awareness campaigns. As the first independent state-level organization in India responsible for energy conservation activities, EMC is the agency charged with enforcing the provisions of Energy Conservation Act, 2001 in the State of Kerala.

The Centre is also promoting development of small hydro power projects within the State. The United Nations Industrial Development Organization (UNIDO) opened its first Regional Centre for Small Hydro Power in the EMC on April 4, 2003. In an effort to boost development of small hydro projects, the Government of Kerala has also created a Small Hydro Promotion Cell, which is attached to EMC.

3.2 OBJECTIVES OF THE ENERGY MANAGEMENT CENTRE

The objectives of the EMC are to facilitate efficient management of all forms of energy, to promote energy efficiency and energy conservation, and to develop new sources of energy. It also develops novel energy technologies geared toward increasing production, improving quality of life, and facilitating sustainable energy use.

The specific objectives of the EMC are:

1. To develop innovative methodologies and techniques and devise programmes for efficient energy management.
2. To identify barriers to improving energy efficiency and propose appropriate measures to overcome them, including policy measures and financial incentives.
3. To carry out, support, and/or promote research studies on energy management.
4. To advise various sectors of state economy connected with the highest energy consumption, (industrial plants, transport, and agriculture) on issues related to all forms of energy and its efficient management.
5. To monitor and promote energy conservation activities in the State of Kerala.
6. To increase the skill and capability of energy professionals, auditors, analysts, and managers.
7. To act as a nodal agency for generation, collection, and dissemination of the latest technical information on energy management.
8. To create and maintain a database on supply, demand, and prices of energy; energy efficiency; energy conservation; and related technologies.
9. To review laws and regulations relating to energy efficiency, develop standards and norms for efficient energy use in various sectors of the State's economy, and propose modifications to existing laws.

10. To liaise with national and international organizations, universities, research centres, regulatory bodies, funding agencies, and other institutions connected with various aspects of energy management. This includes exchanging research results and energy statistics on energy policy, forecasting, and planning techniques.
11. To facilitate exchange of energy experts between the state of Kerala and other regions of India and abroad.
12. To perform such other functions as desired by the Government and undertake other relevant activities to fulfill the objectives of the Center.

3.3 ACTIVITIES OF THE KERALA MANAGEMENT CENTRE STRATEGY

The mission of the EMC is “Achieving sustainable development through enhancing total energy efficiency and application of renewable energy and environment friendly energy systems in all sectors of the economy.” To accomplish this mission, EMC is adopting a multi-faceted institutional and functional strategy, including the following:

- Initiating and strengthening integrated sustainable development in different sectors of economy;
- Promoting energy conservation in all sectors of the economy;
- Creating a comprehensive and suitable programmes for public participation;
- Conduct benchmarking exercises to evaluate energy intensity of key users;
- Initiating and promoting multi-dimensional research, training, education, and awareness programmes;
- Developing a state-of-the-art data bank encompassing all aspects of energy financing;
- Establishing an international research, training, and academic facility for studies on comprehensive energy management;
- Imparting awareness to the public and private sectors on issues related to energy conservation;
- Upgrading the skills and capabilities of energy professionals;
- Facilitating the exchange of energy experts;
- Collaborating with national and international organizations, universities, research centres, regulatory bodies, and funding agencies;
- Operationalizing energy systems;
- Promoting comprehensive energy planning and management through the development of co-operative strategies and institutions;
- Providing grass-roots opportunities to the public to help shape an energy system that improves quality of life and promotes sustainable development.

ACTION PLAN

EMC has developed a Strategic Action Plan for the period of 2007 to 2012, proposed the Kerala State Energy Conservation Policy with the support of the National Productivity Council, and drafted the Energy Conservation Fund rules for government consideration.

PRODUCTS AND PROGRAMS

Some of the products developed by EMC include:

- Temperature Monitoring and Alerting System (TMAS) for Efficiency Improvement in brick and tile industries
- TMAS for efficiency improvement in glass industries

- TMAS for efficiency improvement in rice mills
- Energy metering, monitoring, and management system
- Automatic street light controller
- Thermal cooker (*Thaapabharani*)

The EMC has instituted the Energy Conservation Awards Programme. The Centre has also estimated the energy conservation potential in the tea, rubber, and ice manufacturing industries and has identified the barriers to implementation. One of the key barriers identified is the lack of available financing.

ACTIVITIES RELATED TO THE EC ACT, 2001

There are also 1822 non-designated large energy consumers in Kerala. There are 173 energy managers in Kerala and all public sector undertakings (PSUs) have designated energy managers. **Table 3-1** on the next page lists the designated energy consumers in Kerala as defined by the EC Act, 2001.

To fulfill its responsibilities under the EC Act 2001, the EMC has undertaken the following programs:

- Energy Efficient Street Lighting Programme
- Energy efficiency study of three distribution transformer stations
- Energy audits in 20 government buildings
- Development of touch screen monitors in schools to familiarize students on EE concepts
- Energy conservation programme in public sector undertakings (PSUs)

The EMC has also undertaken EC demonstration projects for small and medium enterprises (SMEs) in the brick and tile industries, and energy monitoring and management systems in the Kerala Industrial Infrastructure Development Corporation (KINFRA) Apparel Park. The EMC's energy education and training programmes include:

- Energy Managers in Designated Industries
- Energy Conservation in Buildings
 - Green Building Concepts
- Energy Conservation in Small and Medium Industries
- Energy Education in Colleges/Schools
 - Energy Conservation Club Projects
- Energy Clinics
 - Domestic Energy Conservation in all districts
 - 3000 Energy Clinics
 - 120 trained female volunteers
 - 15 - 20 percent total energy saving recorded

TABLE 3-1: DESIGNATED ENERGY CONSUMERS IN KERALA

No.	Organization	Industry sector	Consumption (MTOE)
1	Hindustan Newsprint Ltd.	Pulp and Paper	88,741
2	Travancore Cochin Chemicals Ltd.	Chlor-Alkali	17,554
3	National Thermal Power Corp.	Thermal power	N/A
4	Kozhikode Diesel Power Project Royalties Financing (KDPP), Nallalam	Thermal power	47,891
5	Brahmapuram Diesel Power Plant	Thermal power	13,857
6	BSES Kerala Power Ltd.	Thermal power	260,975
7	Kasargod Power Corporation Ltd.	Thermal power	2,350
8	Malabar Cement	Cement	104,515
9	Fertilizers and Chemicals Travancore Ltd.	Fertilizer	17,420
10	GTN Textiles Ltd.	Textiles	3,127
11	PATSPIN India Ltd.	Textiles	3,030

Source: Energy Management Centre, Kerala
Note: million tons of oil equivalent (MTOE)

3.4 ENERGY CONSERVATION ACTIVITIES BY LARGE ENERGY USERS

Interviews conducted with large, commercial energy users indicated that some had already initiated energy conservation activities (see Appendix A for a full list of organizations contacted). The following are illustrative examples.

HINDUSTAN LATEX

Hindustan Latex Ltd (HLL) produces good quality condoms for the National Family Planning Program, and is one of the world's largest manufacturers of condoms, with an annual production capacity of 1000 million pieces. HLL has taken the following steps toward energy conservation:

- Installing pressure-regulating valves in the high- and low-pressure areas within the processing units
- Installing pneumatic foot switches at filling stations to reduce air consumption
- Replacing 240 HP air compressors with one high CFM, 60 HP horizontal air compressor thereby saving electricity
- Reduced the blood bag drying time from 24 hours to 16 hours by providing an exhaust blower

HLL reported that energy efficiency measures for some existing projects can be undertaken using internal sources of funds, while new sources of energy will require costly investment. HLL further expressed interest using ESCO services to ensure savings.

HINDUSTAN NEWSPRINT

Hindustan Newsprint Limited (HNL), a Subsidiary of Hindustan Paper Corporation Ltd., operates one of the largest integrated newsprint mills in the country. Hindustan Newsprint Ltd. has won an award for performance and consistency in implementing energy conservation measures. It was able to achieve significant reduction in overall energy levels through consistent monitoring. Some of the energy savings measures that have been implemented are:

- Use of low energy segments, optimization of refining segments patterns
- Replacement of stock pump with energy efficient pump
- Replacement of 17 dynodrives with Variable Frequency Drives (VFDs) and EE Motors
- More efficient air regulator systems

- Kitchen waste biogas plant and solar water heater
- Use of unconventional fuels like 4,212 metric tons of wood shavings

HNL has been using its own capital funds to carry out the energy efficiency measures.

A further investment of Rs. 257.72 lakhs that would generate savings of approximately Rs. 278.72 lakhs¹ has been proposed by an energy audit. This would progress in different phases, with the first implementation phase occurring in 2008-2009 with a proposed investment of Rs. 35 lakhs.

HNL requested assistance in identifying the areas where energy conservation measures can be applied. HNL also indicated a desire to borrow from the State Energy Conservation Fund if subsidized rates were available.

KERALA MINERALS AND METALS

Kerala Minerals and Metals Ltd. (KMML) indicated that it would conduct a cost-benefit analysis for various energy efficiency projects, and would prioritize those projects that promise high returns.

The energy efficiency projects are financed solely from internal resources. KMML expressed interest in borrowing from the State Energy Conservation Fund if subsidized rates were available.

LEELA KEMPINSKI

Leela Kempinski is a Five Star deluxe hotel at Kovalam Beach, Thiruvananthapuram. The Hotel has a Building Management System (BMS) which primarily monitors the operation of boilers and chillers, including air temperature at Auxiliary Heating Units. The hotel maintains a log of power, diesel, and water consumption in which it closely monitors inputs used by major equipment, such as chillers and boilers, and then analyzes the specific costs associated with heat, light, and power with respect to occupied and available rooms.

The hotel's corporate management based in Mumbai has appropriated the entirety of the funding for EE investments from its internal resources. Rainwater harvesting, flash steam recovery, and installation of mood lighting with programmed control are some of the energy conservation measures that Leela has successfully employed. Energy conservation meetings are held every 15 days to review the developments.

An energy audit has been commissioned but is pending approval with the head office due to the high cost quoted by the energy auditing firm.

LE MERIDIEN

Le Meridien resorts and convention centre in Kochi is one of the largest five star deluxe hotels in Kerala. Energy monitoring and targeting systems have been devised according to an energy policy which has the support of top management. Through its efforts, Le Meridien has saved approximately 10 percent of total energy costs, and was the 2008 recipient of the State Energy Conservation Commendation Certificate awarded by the EMC.

Old electrical heating type chafing dishes with elements of 1 kW have been replaced with 600 W induction type units. This generated a 40 percent savings coupled with more precision in heating food. Sophisticated lighting controllers that include motion sensors, photo cells, and timers have been installed. The resort has a BMS that monitors the operation of boilers and chillers, including air temperature.

Le Meridien uses rainwater harvesting and reverse osmosis, and intends to buy renewable energy from KSEB and invest in ice storage for cooling. Plans are also underway to produce biogas from waste methanation.

1. 1 Lakh = 100,000

3.5 ACTIVITIES OF FINANCIAL INSTITUTIONS

Interviews conducted with selected large, commercial banks in the state helped to provide an understanding of the barriers to scaling up EE investments (see Appendix A for a full list of organizations contacted).

FEDERAL BANK LIMITED

Federal Bank is interested in financing EE projects, provided they are technically viable. The bank does not have technically trained staff for evaluating energy efficient projects. The projects should therefore be appraised by technically competent expert(s). Hard and soft costs should also be taken into consideration.

The bank indicated that risk factors should be covered by the EC fund and guarantees should be available to protect against default. The bank would be willing to fund only the principal borrower even though ESCOs act as intermediaries. There is lack of understanding of ESCOs as project developers. The bankability of an ESCO-implemented project is vital to any investment decision.

STATE BANK OF INDIA

State Bank of India (SBI) has divided the entire country into 14 regions, which are generally contiguous areas of different states/provinces in India.

- Any project that comes to SBI needs to be appraised first. According to SBI officials, EE project appraisal is not different from traditional project appraisal and hence no formal training is required. If needed, the bank can always approach the best experts in the industry for consultations. Therefore, training programmes for the bankers may not be necessary.
- SBI pointed out that the energy efficiency reports stress only the payback period, while little attention is given to the soft and the hard costs. The projects are appraised not only on the simple payback period but also on technical, economic, and financial feasibility as well as commercial viability.
- SBI focuses on high-value projects. The minimum lending amount is 10 crores¹ and can go beyond 300 crores. SBI prefers to lend to existing customers.

In general, in the case of large projects that receive lending from SBI, the project developers prefer to use internal resources to address the EE component of overall project cost. This lowers the overall transaction cost related to loan processing.

SBI is not inclined to finance EE projects in ESCO mode because of the ESCOs' limited financial strength.

SBI suggests that the State Energy Conservation Fund should initially invest in demonstration projects. The Fund should identify "first movers" or early adopters and encourage them to participate in energy efficiency projects. Further, to instill confidence and reduce risk factors, it is recommended that a majority of the implementation costs be borne from the Fund.

PRELIMINARY FINDINGS

The preliminary findings from the assessments to date are as follows:

- Large energy users have initiated some activities with their own funds, but have indicated their interest in obtaining specialized financing for EC projects;
- ESCOs have not been active in the market due to lack of demand;
- Commercial banks are interested but cite lack of knowledge and experience, and a perception of high risk. They would like to see risk mitigation schemes established;

1. 1 Crore = 10 million

- There are no detailed studies of energy conservation potential by sub-sector;
- Implementation to date has been far short of potential.

REQUIREMENTS FOR A STATE ENERGY CONSERVATION FUND

Based on an assessment of the experience with EE financing in Kerala till date and best practices in EC funds established elsewhere, the key requirements for the establishment of an EC fund are:

- Good understanding of the financing needs of EC projects;
- Knowledge of existing market barriers and awareness of how to overcome these barriers;
- Commitment of designated agency management to facilitate EC project financing;
- Capacity of designated agency management to facilitate EC project financing;
- Commitment of senior state officials to support a SECF;
- Existence of EC activities already initiated by the designated agency;
- Significant market size for EC projects;
- Existence of market actors who are willing access funding opportunities offered by the SECF.

SECTION 4

ENERGY CONSERVATION POTENTIAL IN KERALA

4.1 INTRODUCTION

There has been no comprehensive assessment of the EC potential in Kerala, and such an assessment was beyond the scope of this effort. However, based on the information presented in **Section 3** and the experience of the EMC in conducting EC activities, it is clear that the EC potential is significant. This section presents a preliminary estimate of the EC potential using currently available data.

4.2 SAVINGS IDENTIFIED THROUGH ENERGY AUDITS

The Kerala State Productivity Council has conducted a number of energy audits to identify energy savings potential. **Table 4-1** provides the data from these audits, including:

- Name of Organization
- Date of Audit
- Type of Industry
- Annual Consumption
 - Thermal
 - Electrical
 - Total
- Savings Potential
 - Thermal
 - Electrical
 - Total
- Savings Potential as Percentage of Consumption

TABLE 4-1: SAVINGS IDENTIFIED THROUGH ENERGY AUDITS (2006-2007)

SI No.	Name of Organization	Month & Year	Type of Industry	Yearly Consumption						Saving Potential Identified						Saving Potential Identified as Percentage Savings (%)					
				Thermal		Electrical		Total Energy MTOE	Thermal		Electrical		Total Energy MTOE	Thermal Solid Fuel MT	Thermal Fuel Oil MT	Thermal Energy KWh	Electrical Energy MTOE	Total Energy MTOE	Thermal Solid Fuel	Thermal Fuel Oil	Electrical
				Solid Fuel MT	Fuel Oil MT	Energy KWh	Energy MTOE	Solid Fuel MT	Fuel Oil MT	Energy KWh	Energy MTOE	Solid Fuel MT	Fuel Oil MT	Energy KWh	Energy MTOE	Solid Fuel MT	Fuel Oil MT	Energy KWh	Energy MTOE	Solid Fuel MT	Fuel Oil MT
1	Energy Use Optimization Study in Kochi Corporation	Mar - 06	Street Lighting	0	0	18,218,035	1,530	1,530	0	0	5,655,681	475.07	0	0	475.07	475.07	-	-	31		
2	Cochin Yacht Club, Thevara	May - 06	Recreation Club	0	0	92,622	8	8	0	0	8,939	0.75	0	0	0.75	0.75	-	-	10		
3	Tata Tea Limited, Tata Tetley Division, Cochin	May - 06	Tea Processing	0	0	1,103,038	93	93	0	0	106,546	8.95	0	0	8.95	8.95	-	-	10		
4	Mardac R.K. Latex Private limited, Kannambra, Palakkad	Jun - 06	Process Industry	0	0	323,152	27	24	0	0	0	0	0	0	0	0	-	-	0		
5	Mardac R.K. Latex Private limited, Nilambur	Jun - 06	Process Industry	0	0	544,797	46	46	0	0	5,808	0.49	0	0	0.49	0.49	-	-	1		
6	Malankara Orthodox Syrian Church Medical College Hospital, Kolenchery	Jul - 06	Hospital	0	0	491,850	41	41	0	0	196,669	16.52	0	0	16.52	16.52	-	-	40		
7	Agreenco TSR Factory, Mannarkad, Palakkad	Jul - 06	Process Industry	270	2	105,205	9	281	56.78	0	10,836	0.91	57.69	0	57.69	57.69	21	0	10		
8	Modern Food Industries Ltd, Edappally	Aug - 06	Food Processing (Bread)	0	0	841,065	71	71	0	0	219,902	18.47	18.47	0	18.47	18.47	-	-	26		
9	Foam Mattings (India) Limited, Alappuzha	Sep - 06	Process Industry (Coir)	0	206	308,928	26	232	0	100.30	27,790	2.33	102.63	0	102.63	102.63	-	49	9		

Note: million tons (MT), million tons of oil equivalent (MTOE)

SI No.	Name of Organization	Month & Year	Type of Industry	Yearly Consumption						Saving Potential Identified						Saving Potential Identified as Percentage Savings (%)		
				Thermal		Electrical		Total Energy MTOE	Thermal		Electrical		Total Energy MTOE	Thermal Solid	Thermal Fuel Oil	Electrical		
				Solid Fuel MT	Fuel Oil MT	Energy kWh	Energy MTOE	Solid Fuel MT	Fuel Oil MT	Energy kWh	Energy MTOE	Solid Fuel MT	Fuel Oil MT	Energy kWh	Energy MTOE	Thermal Solid	Thermal Fuel Oil	Electrical
10	KSE Air cargo division, Thiruvananthapuram	Oct - 06	Service	0	0	477,237	40	40	0	0	123,405	10.37	10.37	-	-	26		
11	Elite Breads Pvt Ltd, Athani, Thrissur	Oct - 06	Food Processing (Bread)	0	0.080	429,104	36	36	0	0.007	45,231	3.80	3.80	-	9	11		
12	Achoor Tea Factory of M/s. Harrisons Malayalam Ltd, Achoor estate, Kalpatta, Wayanad	Dec - 06	Tea Processing	-	0	1,877,535	158	158	515	0	20,543	1.73	1.73	-	-	1		
13	The Arapetta Tea Factory of M/s. Harrisons Malayalam Ltd	Dec - 06	Tea Processing	-	0	999,332	84	84	0	0	22,148	1.86	1.86	-	-	2		
14	Chundale Tea Factory of M/s. Harrisons Malayalam Ltd	Dec -06	Tea Processing	-	0	651,520	55	55	325	0	43,146	3.62	3.62	-	-	7		
15	Mongatar Tea Factory of M/s. Harrisons Malayalam Ltd	Dec - 06	Tea Processing	-	0	891,094	75	75	0	0	27,798	2.34	2.34	-	-	3		
16	Sentinel Rock Tea Factory of M/s. Harrisons Malayalam Ltd	Dec - 06	Tea Processing	-	0	579,575	49	49	0	0	-	-	-	-	-	-		

Source: Presentation by Dr. K.M. Dhairesan Unnithan, Director, EMC-Kerala at a July 2008 workshop on Establishing a State Energy Conservation Fund in Kerala, Thiruvananthapuram. The workshop was organized by the USAID ECO-Asia Clean Development and Climate Program.
Note: million tons (MT), million tons of oil equivalent (MTOE)

4.3 SAVINGS ACHIEVED BY INDUSTRIAL UNITS

Based on the information developed by the EMC as a part of the Energy Conservation Awards scheme, the total energy savings achieved by the number of firms providing data was 32 MW. **Table 4-2** summarizes this information.

Year	No. of Consumers	Savings in Rs. Lakhs	Investment in Rs. Lakhs	Million Units	Mega Watt	Furnace Oil (Metric Tons)	Coal (Metric Tons)
2007	21	1,915	1,098	59.735	11.34	1,304	
2006	27	2,343	4,080	40	7.61	6,665	2,870
2005	17	839	1,654	23.52	4.48	850	
2004	12	874	1,087	12.82	2.44	3,170	5,558
2003	9	1,746	7,641	32.32	6.15	8,169	6,433
5 Years	86	7,717	15,561	168.395	32.02	20,158	14,861

Source: Presentation by Dr. K.M. Dhaharan Unnithan, Director, EMC-Kerala at a July 2008 workshop on Establishing a State Energy Conservation Fund in Kerala, Thiruvananthapuram. The workshop was organized by the USAID ECO-Asia Clean Development and Climate Program.

4.4 SAVINGS IDENTIFIED BY EMC IN SPECIFIC INDUSTRIES

EMC has conducted studies of EC potential in several industries in Kerala. The results have shown the following savings potential average by industry:

- Tea Industry – Savings 0.6 kWh/kg
- Rubber Industry – Savings 0.6-0.7 kWh/kg
- Ice Manufacturing – Savings 10-16 kWh/T
- Buildings – Savings of 22 percent electricity; 50 percent of water consumption

4.5 ASSESSMENT OF ENERGY CONSERVATION POTENTIAL

Table 4-3 summarizes the key characteristics of different types of energy consumers with respect to energy savings, with a focus on electricity consumption. The table assesses industrial (large and SME), commercial, government (state buildings and municipal authorities), agricultural, and domestic consumers qualitatively with respect to:

- Total energy consumption
- Energy savings potential
- Incentives for energy conservation
- Knowledge and expertise
- Technical resources
- Financial resources

TABLE 4-3: ENERGY SAVINGS ATTRIBUTES OF KEY ECONOMIC SECTORS

Consumer Type	Total Consumption	Savings Potential	Incentive	Knowledge/ Expertise	Technical Resources	Financial Resources
Industry - Large	High	High	High	High	High	High
Industry - SME	Medium	High	High	Low	Low	Low
Commercial	Medium	High	Medium	Low	Medium	Medium
Government Buildings	Medium	High	Low	Low	Medium	Low
Municipal Authorities	High	High	Low	Low	Low	Low
Agriculture	Medium	High	Low	Low	Low	Low
Domestic	Medium	High	High	Low	Low	Low

Source: Compilation based on interaction with selected consumers

The conclusions of this assessment are that:

- The energy savings potential is high in all sectors.
- The incentive to save energy is high in the industrial and domestic sectors, but low or medium in the other sectors. This is due to the relative importance of energy to industrial and domestic operations in addition to institutional characteristics.
- Only the large industry sector has sufficient technical knowledge regarding energy conservation methods, techniques, and options.
- Only the large industry sector has the technical and financial resources to implement energy saving measures. However, the reality of competing demands for capital expenditure may sideline efforts to realize energy savings.
- The commercial and government sectors have some technical and financial resources, but these are generally too limited to launch and sustain serious energy savings efforts.
- The SME, municipalities, agriculture, and domestic sectors have very limited technical and financial resources for energy savings, and therefore need substantial technical and financial assistance to employ energy conservation options.

4.6 ENERGY CONSUMPTION AND CONSERVATION POTENTIAL IN INDUSTRY

The project team compiled detailed information on energy consumption by large electricity consumers in Kerala and analyzed this information to estimate the potential for energy conservation.

Data on large energy uses, in the form of a database with the names, codes, tariff categories (EHT1, EHT2, EHT3, Grid 1, Grid 2, Grid 3, HT1, HT2, HT3, HT-I-P, HT4) and contract demands, was obtained from the KSEB. This was compared with data on the KSEB monthly consumption for the year from April 2007 through March 2008, and the two were merged together to calculate the average consumption for roughly 2450 large consumers. For the KSEB consumers, where the data on Contract Maximum Demand (CMD) was not available, it was calculated by dividing the average consumption by the number of hours per day then further dividing it by the number of working days.

The merged data was then sorted and approximately 1000 consumers over 250 KVA of CMD were extracted. These 1000 consumers were classified by the type of industry or activity (such as agriculture, cement, hospitals, and railways). A percentage savings estimate for each of these classifications was based on data from national audits carried out for each industry or activity type. The total consumption of these 1000 consumers is 92 percent of the total consumption for the categories mentioned.

Table 4-4 summarizes the calculations by industry or type of activity. Based on a detailed analysis of the 1000 large consumers, there is an estimated energy conservation potential of about 557 Million kWh out of a total consumption of 3387 Million kWh for the tariff categories.

TABLE 4-4: ENERGY CONSUMPTION AND CONSERVATION POTENTIAL BY CONSUMER TYPE

Consumer Type	Category	No. of Consumers	Average Monthly Consumption (kWh) –Category-Wise	EC Potential	
				%	Total (kWh)
Aluminium	1	3	1,779,034	10	177,903
Auto	2	2	502,410	15	75,361
Cement	3	7	5,204,651	15	780,698
Industrial gases	4	25	35,714,722	15	5,357,208
Agriculture	7	20	2,251,825	20	450,365
Pharmaceuticals	8	6	168,076	15	25,211
Fertilizers	10	2	8,880,042	15	133,2006
Food	11	118	15,172,260	15	2,275,839
Water Authorities	14	104	21,824,930	25	5,456,233
State agencies	15	99	9,481,735	25	2,370,434
Pulp & paper	16	19	10,101,738	25	2,525,435
Chemicals	17	8	4,160,326	10	416,033
Flour mills	18	35	2,809,644	15	421,447
Steel	19	67	49,563,035	10	4,956,304
Petroleum	20	7	399,674	10	39,967
Textiles	21	54	20,045,911	25	5,011,478
Rubber	22	66	18,247,865	15	2,737,180
Machinery	23	118	32,280,687	15	48,42,103
Stone and glass	24	52	17,272,770	10	1,727,277
Hotels & resorts	25	63	6,013,127	25	1,503,282
Health care	26	74	9,343,381	25	2,335,845
Railways	27	16	11,056,362	15	1,658,454
Total			282,274,203		46,476,062
Total annual consumption			3,387,290,436	Total savings potential	557,712,742

Source: ECO-Asia Clean Development and Climate Program research based on consumer data provided by Kerala State Electricity Board

SECTION 5

OVERCOMING THE BARRIERS TO IMPROVING ENERGY EFFICIENCY

5.1 BARRIERS TO IMPLEMENTATION

Despite the laudable efforts of the EMC to promote energy conservation projects in Kerala and the activities undertaken by many electricity consumers, the actual implementation of energy conservation projects remains far below the potential. Discussions with the EMC, industrial and commercial consumers, government officials, energy managers in Public Sector Undertakings (PSUs), financial institutions, and energy service providers have pointed out that there are many barriers to implementation of energy conservation projects.

Some of the most important barriers include:

- **Lack of knowledge and awareness.** Consumers in many energy sectors do not have sufficient technical knowledge of EC options and their applicability.
- **New EC technologies.** Some of the newer EC products, equipments, and technologies are more difficult to finance because they are not widely known.
- **Limited availability of funds.** An organization's funding has many competing demands and are not always available for EC projects.
- **Relatively small size of EC projects.** The relatively small size of EC projects make them less attractive for conventional bank financing.
- **Limited applications of project financing for EC.** The concept of "project financing" has not yet been accepted for EC projects.
- **Lack of experience of FIs.** Conventional lenders do not have sufficient knowledge of EC technologies and their financial benefits;
- **Risk perception.** Financial institutions may perceive EC projects to be more risky than conventional lending projects.
- **Requirement for collateral or balance sheet financing.** Financial institutions usually require high levels of collateral or strong borrower balance sheets to provide financing. Most SME customers and energy service providers do not have collateral or strong balance sheets.
- **Transaction costs.** The transaction costs for EC projects are relatively high.
- **High development costs.** EC projects have a relatively high proportion of development costs (also known as soft costs).
- **Lack of "investment grade" proposals.** FIs often complain that the proposals from consumers or ESCOs for financing EC projects are not sufficiently documented and therefore cannot be considered to be investment grade.

- **Monitoring, measurement, and evaluation of energy savings.** Adequate methods and tools are not readily available to demonstrate and document achieved energy savings.
- **Limited infrastructure for EC project implementation.** The number of knowledgeable and experienced energy service providers in Kerala is very limited.

These barriers are not unique to Kerala. They are quite common throughout the rest of India, and in many other countries, both in the developed and developing worlds. Many of the above barriers relate to financing and could be addressed through the creation of an energy conservation or energy efficiency fund (EC Fund).

Recognizing the potential value of an EC Fund in accelerating the scope and number of EC projects, the Government of India, in the national Energy Conservation Act, 2001 (EC Act, 2001), mandated that each State establish a State Energy Conservation Fund.

5.2 INTERNATIONAL BEST PRACTICES: ENERGY CONSERVATION FUNDS

An analysis was conducted of the international best practices in energy conservation funds to identify the approaches and methods used in many different countries for establishing EC Funds. The major lessons from the international assessment include:

- In the United States (US), while the Federal government has implemented a number of energy efficiency initiatives, much of the activity related to energy efficiency funds has been at the State level.
- EE funds have been very successfully used in a number of US states.
- The mechanisms used by states to establish EE Funds include:
 - Regulations establishing a tariff levy or tax on electricity consumption
 - Special taxes
 - General state tax revenues
 - State bonds
 - Petroleum taxes
 - Certification fees
- The most common, reliable, and sustainable source of funding is a tariff levy established by the regulator and collected by the utility via the customer's bill.
- The levels of funding vary from state to state. More progressive states have assessed a levy of one to three percent of electricity sales revenue to finance their EE Funds (see **Table 5-1**).

Similar EE funds have also been established in a number of other countries. Examples of funds include:

- New South Wales – Sustainable Energy Fund
- New Zealand – Sustainable Management Fund
- Thailand Energy Conservation Fund

TABLE 5-1: SIZE OF EE FUNDS IN THE UNITED STATES AS PERCENTAGE OF ELECTRICITY REVENUES

State	EE Spending as Percentage of Annual Utility Revenues (%)
Vermont	3.0
Massachusetts	2.4
Washington	2.0
Rhode Island	1.9
New Hampshire	1.8
Oregon	1.7
Wisconsin	1.4
New Jersey	1.4
Montana	1.3
California	1.2
New York	1.0

Source: Presentation on 'Energy Conservation Funds: International Best Practices' by Mr. Dilip R. Limaye at a July 2008 Roundtable on Establishing a State Energy Conservation Fund in Kerala, Thiruvananthapuram. The workshop was organized by the USAID ECO-Asia Clean Development and Climate Program.

(ENCON)

- Romania Energy Efficiency Fund (FREE)
- Czech Republic Energy Savings Fund
- International Finance Corporation – Hungarian EE Fund and CEEF Fund
- Brazil – Energy Efficiency Charge
- Sri Lanka – Energy Conservation Fund
- Korea – Korea Energy Management Fund

The funds created from such a levy may be administered by utilities or by other fund managers, such as:

- Existing government agencies
- Specialized statutory agencies
- Public-Private Partnerships
- Financial institutions

The functional requirements for an EE fund include:

- Fund management
- Program planning and administration
 - Program development
 - Procurement of goods and services
 - Disbursement
 - Financial management and reporting
- Delivery
 - Promotion and marketing
 - Goods and services delivery
- Monitoring and Evaluation
 - Development of protocols
 - Collection, analysis, and reporting
- Oversight and Results Monitoring
 - Budget and program design approval
 - Prudence, effectiveness, and reasonableness review

The management of the Funds may be entrusted to a number of different organizations, including:

- Electric utilities
- Specially created government agencies
- Municipalities
- Third Parties
- Statutory Authorities
- Public-Private partnerships
- Independent Entities (with a Board of Directors comprised of stakeholders)

- Financial institutions
- Non-Government Organizations (NGOs)

The selection of the fund management organization is based on consideration of the following criteria:

- Compatibility with public policy goals
- Credibility with funders and customers
- Technical, financial, and administrative capacity
- Management incentive structure
- Ability to realize economies of scale and scope
- Minimal start-up requirements
- Ability to work collaboratively across agencies
- Ability to engage with Demand Side Management (DSM) EE stakeholders

The project financing mechanisms utilized by the EE funds include:

- Grants
- Loans
- Subsidies
- Equity Funds
- Loan guarantees
- Credit guarantees
- Supplier credits

The criteria used for the selection of projects include:

- Technical feasibility
- Compliance with environmental standards
- Financial stability
- Acceptable level of risk
- Replicability
- Contribution to developing sustainable DSM/EE markets
- Proper preparation and documentation

Best Practices - Examples of successful funds include:

- California State Fund
- New York State Energy Research and Development Authority (NYSERDA)
- Energy Trust of Oregon
- Efficiency Vermont

5.3 ADDRESSING THE BARRIERS TO IMPLEMENTATION

The assessment of international experience with EE funds has demonstrated that such funds can be very effective in addressing the barriers to the implementation of EC projects, as shown in **Table 5-2**.

TABLE 5-2: ADDRESSING EE BARRIERS THROUGH EC FUNDS

Barrier	Impact of Fund
Lack of knowledge and awareness	Fund supports demonstration projects; publicizes success stories
New EC technologies	Finance projects with innovative technologies; provide training and education, publicize success stories
Limited funds availability	Provide funds for projects; supplement conventional FI financing
Small EC project size	Facilitate financing of small projects; standardize and aggregate projects
Limited applications of project financing	Educate FIs on applicability of project financing; provide risk guarantees
Lack of FI experience	Provide information and training to FIs; work with FIs to finance demonstration projects
Perception of risk	Provide risk guarantees; document and publicize success stories
Collateral or strong balance sheet requirement	Provide credit guarantees; assist ESCOs in project financing
High transaction costs	Standardize project financing application forms; create forum for interaction among FIs and project developers
High development costs	Finance and/or subsidize energy audits; educate consumers on benefits of EC and on possible role of ESCOs
Lack of investment grade proposals	Develop guidelines and procedures for project proposals; finance demonstration projects
Monitoring, measurement and verification methods and tools	Develop guidelines and procedures for Monitoring and Verification (M&V); demonstrate the applications in early projects
Limited infrastructure for EC implementation	Provide a clear signal to the market that EC Fund will be financing projects on an on-going basis

SECTION 6

PROPOSED STRUCTURE OF THE KSECF

6.1 RATIONALE FOR KSECF

The KSECF will:

- Facilitate increased implementation of EC projects by large energy users
- Engage commercial financial institutions to participate in EC project financing
- Facilitate ESCO industry development and participation in EC project implementation
- Demonstrate leadership in EC through implementation of EC projects in public buildings
- Alleviate the power shortage and related impacts on the state economy
- Meet the mandated requirements of the EC Act, 2001

6.2 OBJECTIVES AND SCOPE OF KSECF

The objectives and scope of the KSECF are:

- Support the financing of specific EC projects using a variety of options such as debt financing, equity financing, grants, and credit or risk guarantees to financial institutions;
- Contribute to the development of the EE market in Kerala by financing projects with private sector implementation through energy service delivery organizations (such as ESCOs);
- Develop and demonstrate model financial transactions;
- Develop typical financing agreements that can be used by the private sector;
- Build the capacity of local financial institutions to conduct EE project transactions;
- Leverage commercial funds to create a sustainable market for EC project financing.

The KSECF shall provide financing for all energy consuming sectors, including industrial, SME, commercial, domestic, street lighting, and agricultural sectors. Funding will depend on their risk profiles and viability, in addition to their potential for replication across the state.

6.3 POTENTIAL FUNDING SOURCES

There is a wide range of potential funding sources for the KSECF. These sources include:

- **Funds from Kerala Electricity Surcharge.** In Kerala, there is an existing electricity surcharge (specified under the Kerala Electricity Surcharge (Act, 1989) that is levied by the Kerala State Electricity Board (KSEB) on high tension and extra high tension customers and is collected by KSEB to be paid to the Government of Kerala. It is estimated that the annual amount of this duty is about Rs. 220 crores¹, of which a portion could be dedicated to the KSECF.
- **Budget Allocation.** The State Government may be able to allocate funds to the KSECF from the

1. This translates to 40 million USD at current exchange rates (50 Rupees = 1 USD)

annual fiscal budget;

- **Special Taxes.** Special legislative measures may be enacted to create new taxes for energy conservation funding.
- **Government Bonds.** Special bonds may be issued by a government agency to finance EC projects;
- **Funds from Bureau of Energy Efficiency.** The Bureau of Energy Efficiency is likely to provide matching funds if the KSECF is established with state funds.
- **Donor Agencies and International Financial Institutions.** Bilateral and multilateral development agencies and international financial institutions such as the Asian Development Bank, the International Finance Corporation, and the World Bank, could also be potential sources of supplemental financing. may be potential sources of financing.
- **Certification and Labeling Fees.** Funds may be received from certification and labeling fees specified by the EC Act, 2001 and collected by the EMC.
- **Commercial Financing.** Commercial financial institutions may be able to provide supplemental financing to the KSECF.
- **Carbon Financing.** Revenues earned from the sale of from carbon credits resulting from energy savings may be a potential funding source for the KSECF.

6.4 SIZE OF THE FUND

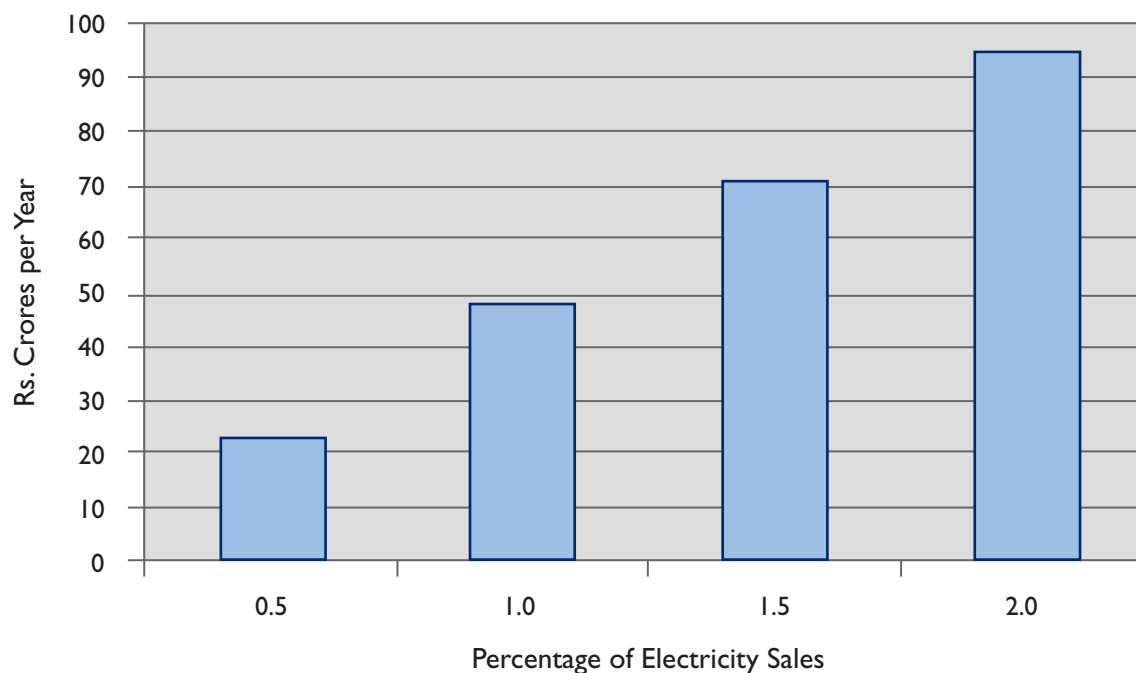
The size of the KSECF should be determined based on the potential for EC projects and the ability of the state to prudently manage the Fund. International experience with EC funds indicates that most state EC funds have budgets in the range of 0.5 to 2.0 percent of the annual electricity sales in that state. International best practices also indicate that the most reliable and sustainable funding mechanism is a levy on electricity sales.

The estimated annual electricity sales revenues in Kerala for the fiscal year 2007-2008 are Rs. 4,741 Crores. Using a range of 0.5 to 2.0 percent will provide from Rs. 23.7 Crores to Rs. 94.8 Crores¹ to Fund (**Figure 6-1**):

1. This translates to 5 to 20 million USD at current exchange rates (50 Rupees = 1 USD)

This is graphically illustrated in Figure 6-1:

FIGURE 6-1: SIZE OF THE KSECF AS A PERCENTAGE OF ELECTRICITY SALES



Source: Presentation on 'Options for Establishing an Energy Conservation Fund for Kerala' by Mr. Dilip R. Limaye at a July 2008 Roundtable on establishing a State Energy Conservation Fund in Kerala, Thiruvananthapuram. The workshop was organized by the USAID ECO-Asia Clean Development and Climate Program.

While the KSECF can be launched with a budgetary allocation of Rs. 0.5 - 1.0 crore¹, there is a need to complement this with additional resources brought in through one or more of the options outlined in this report. It may be desirable to target an initial level of funding to KSECF at the lower level of 0.5 percent over the first 3- 4 years, depending on the demand for financing and response from other FIs with contributions to the KSECF.

6.5 USE OF THE FUNDS - POTENTIAL FINANCING MECHANISMS

The KSECF could facilitate and finance EC projects in a variety of ways. Examples include:

- **Commercial Loans.** These are loans based on market rates and largely employed to remove the perceived credit risk of EC projects.
- **“Soft” Loans.** These are loans given at below market interest rates (and in some cases with no interest rate at all) to facilitate financing of EC projects.
- **Subordinated Debts.** These are loans given in tandem with commercial loans, but are subordinated to the commercial loans, so that in case of default by the borrower the commercial loans are given priority of payment over those from the EE or sustainable funds.
- **Equity Investments.** These are investments made by the funds in the form of equity share in the project. Providing additional equity investments gives the project additional leverage to gain access to commercial financing.
- **Other Equity Type Financing.** These are investments made by the funds in the form of convertible, redeemable, preferred shares. Usually the redemption period is scheduled after the project starts to

1. This translates to 100,000 to 200,000 USD at current exchange rates (50 Rupees = 1 USD)

realize savings from EE improvements.

- **Interest Buy-Down.** These are loans given at a very low or no interest, in tandem with commercial financing that carries a market interest rate. The low interest or no interest portion coming from the fund lowers the effective rate of the total loan.
- **Royalties Financing.** This scheme involves providing a loan to a firm (borrower) with a proprietary technology that will be licensed to an energy user as part of an EC project. The repayment of the loan is made from the royalty payment received by the borrower as a technology license fee from the energy user where the EC project is implemented.
- **Grants.** These are usually in the form of cost sharing through grants for energy audits. Some funds provide pure grants but usually require counterpart financing from the project proponent. One fund provides a grant for up to 75 percent of the total project cost but puts a cap on salaries and wages. Another fund provided grants in the form of production incentives.
- **Subsidies.** This is a financing scheme that effectively lowers the capital cost of the EC project. The subsidy is based on the capacity of equipment installed.
- **Cash Rebates.** This is cash refund upon implementation of the EC project. The funds reviewed in this report offered rebates in the form of tax credits.
- **Credit Guarantees or Risk Guarantees.** The fund can be used to provide credit or risk guarantees to commercial banks to reduce their perceived financing risk and to leverage additional financing from commercial sources for EC projects.
- **Acquisition of “EC Resources”.** The fund can be used to “purchase” or “acquire” energy savings by paying the project sponsor for verified energy savings in a manner similar to the mechanisms used for carbon financing.

6.6 CRITERIA FOR PROJECT FINANCING

Once the KSECF is established, it will need to define the criteria for selecting projects to be financed. It is recommended that the following criteria be used:

- Technically feasible
- Meets environmental standards
- Financially sound
- Acceptable level of risk
- Replicable
- Contributing to the development of sustainable EE markets
- Supported by an energy audit or a detailed project report (DPR), prepared by an accredited energy auditor

6.7 MANAGEMENT AND GOVERNANCE

The KSECF can be managed by the EMC. However, it should be noted that as the fund size grows, the EMC would need to add substantial capacity in the area of financing and financial management. Therefore, it is recommended that the Government of Kerala consider the engagement of a professional fund manager under the direction of the EMC as the fund grows.

Other options that may be considered by the GOK for fund management include a newly created Trust or Agency similar to the Energy Trust of Oregon or the New York State Energy Research and Development Authority (NYSERDA).

The KSECF could have a Steering Committee comprised of representatives of the major stakeholders.

SECTION 7

RECOMMENDATIONS

It is recommended that the Government of Kerala move forward immediately with the establishment of the KSECF and make the following decisions.

7.1 FUND ESTABLISHMENT

The Government of Kerala should establish the KSECF initially within the EMC to meet the legislative directives of the EC Act, 2001.

7.2 FUND SIZE

Initially the GOK could provide funding of .5 crore to 1 crore¹ from the Department of Power budget to establish the KSECF by January 1, 2009. A request should then be made to the Bureau of Energy efficiency for matching funds to double the size of the KSECF. The fund size could subsequently be expanded to about 0.5-1 percent of electricity sales revenues.

7.3 OTHER FUNDING SOURCES

Once the initial Fund has been established, the GOK could identify and solicit funds from other sources to increase the size of the Fund. One potential source of funding is the Kerala Electricity Surcharge Fund. Other sources that should be considered include budget allocations through special legislation starting with fiscal year 2009-2010, additional funds from the BEE, donor agencies, and commercial and international financial institutions, including the Asian Development Bank and the International Finance Corporation. A number of financial institutions have indicated their willingness to contribute to the fund.

7.4 MANAGEMENT AND GOVERNANCE

Initially the KSECF should be managed by the EMC under the direction of a Steering Committee.

As the Fund size is expanded, a professional financial manager could be identified and selected using a competitive process. Once a professional manager is selected, the GOK could appoint a new Board of Directors for KSECF composed of:

- Secretary, Department of Power- Chairman
- Secretary, Department of Finance
- Representative of BEE
- Secretary, Department of Industries and Commerce
- Secretary, Department of Local Self-Government
- Director, Bureau of Public Enterprise (BPE) Department
- Two representatives from industry associations and chambers of commerce
- Two representatives who are well versed with technical and financial aspects of EE project implementation
- Financial institutions (when they contribute to the SECF)

1. This translates to 100,000 to 200,000 USD at current exchange rates (50 Rupees = 1 USD)

Director, EMC will function as the Member Secretary of the Steering Committee.

7.5 FINANCING MECHANISMS

Initially, the KSECF should implement the following financing mechanisms:

- Subsidies for energy audits
- Low-interest loans or interest buy-down
- Financing of public building EC projects
- Credit guarantees or risk guarantees to facilitate commercial financing of EC projects by reducing the perceived risks

Additional financing mechanisms could be developed in the second year of operations, including specially designed grants for public interest projects, equity investments, or co-investments with commercial financial institutions.

7.6 ESTABLISHING PROJECT SELECTION CRITERIA

KSECF should develop and establish a set of criteria for selecting the initial projects that includes some or all of the following:

- The project must be technically feasible;
- The project must meet environmental standards;
- The project must be economically and financially sound;
- The risks of the project should be manageable;
- The project must be replicable in the state of Kerala;
- The implementation of the project should contribute to the development of sustainable EE markets;
- The project has to be supported by an appropriate detailed project report (DPR). For example, in the industrial or SME sector there should be an investment grade energy audit prepared by an accredited energy auditor.

7.7 ENCOURAGING ESCO ACTIVITIES

The KSECF could promote the entry, establishment, and development of energy service companies (ESCOs) and other energy services providers in Kerala. Suggested measures include:

- Providing a clear signal to existing Indian and foreign ESCOs that the KSECF will provide funding for EC projects implemented by ESCOs;
- Developing and implementing procedures for public agency EC projects that utilize the performance contracting mechanism;
- Working with local FIs to encourage them to finance ESCO projects;
- Providing attractive financing for ESCO projects;
- Considering equity financing or establishing an equity fund for ESCOs.

7.8 TRAINING AND CAPACITY BUILDING

KSECF should work closely with the EMC to develop and implement training and capacity building activities for energy users, energy managers, ESCOs and other energy service providers, and financial institutions. KSECF could leverage its funds with additional technical assistance support from donor agencies.

7.9 AWARENESS PROGRAMS

The EMC already supports a range of awareness, education, and training programs for energy conservation and is expected to continue these programs. The KSECF should complement the EMC's activities in these areas.

7.10 DEVELOPMENT OF INITIAL PIPELINE OF PROJECTS

The KSECF should initiate activities to identify and develop an initial set of projects to be borne by the Fund. These initial projects should be selected using the criteria developed by the KSECF as discussed.

7.11 IMMEDIATE NEXT STEPS

The following are the recommended immediate next steps:

ACTIVITY	RECOMMENDED DATE
Approve initial budget allocation from the DOP	November 30, 2008
Apply for matching funds from BEE	December 31, 2008
Issue orders for the KSECF including institutional and management directives	December 31, 2008
Make the KSECF operational	January 1, 2009
Formally "launch" the KSECF and conduct Second Stakeholder Roundtable	January 15, 2009
Modify the KSECF structure, if needed, based on the Roundtable; Define and approve project schemes for support	February 28, 2009
Develop and approve detailed KSECF rules, regulations and procedures	March 31, 2009
Initiate project support	April 1, 2009
Start implementing projects	June 30, 2009

APPENDIX A

LIST OF INSTITUTIONS CONTACTED

Banks

Canara Bank Circle Office Trivandrum

Catholic Syrian Bank, Thrissur

Federal Bank Limited, Aluva

Kerala State Power and Infrastructure Corporation Ltd, Trivandrum

Small Industries Development Bank of India (SIDBI), Kochi

South Indian Bank, Thrissur

State Bank of India (SBI), New Delhi

State Bank of Travancore, Thiruvananthapuram

Union Bank of India, Kochi

Indian Renewable Energy Development Agency Limited (IREDA), New Delhi

ESCOs

DSCL Energy Services Company Ltd., New Delhi

Real Energy, Vijaywada, AP

Others

Agency for Non-conventional Energy and Rural Technology, Thiruvananthapuram

Department of Public Enterprises Government of Kerala

Energy Management Centre, Thiruvananthapuram

Hindustan Latex Ltd. (HLL), Thiruvananthapuram

Hindustan Newsprint Limited (HNL), Kottayam

Kerala Co-operative Milk Marketing Federation (KCMMF)-MILMA, Thiruvananthapuram

Kerala Industrial Technical Consultancy Organization (KITCO) Ltd., Cochin

Kerala Minerals and Metals Ltd. (KMML), Kollam

Kerala State Electricity Board (KSEB), Thiruvananthapuram

Kerala State Industrial Development Corporation (KSIDC), Thiruvananthapuram

Kerala State Productivity Council, Cochin

Leela Kempinski Kovalam Beach, Thiruvananthapuram

Le-Meridien resorts and Convention Centre, Kochi

Planning Board, Government of Kerala

Quillon Radio Service (QRS), Thiruvananthapuram

United States Agency for International Development
Regional Development Mission for Asia
GPF Witthayu Tower A, 10th Floor
93/1 Wireless Road
Bangkok 10330 Thailand