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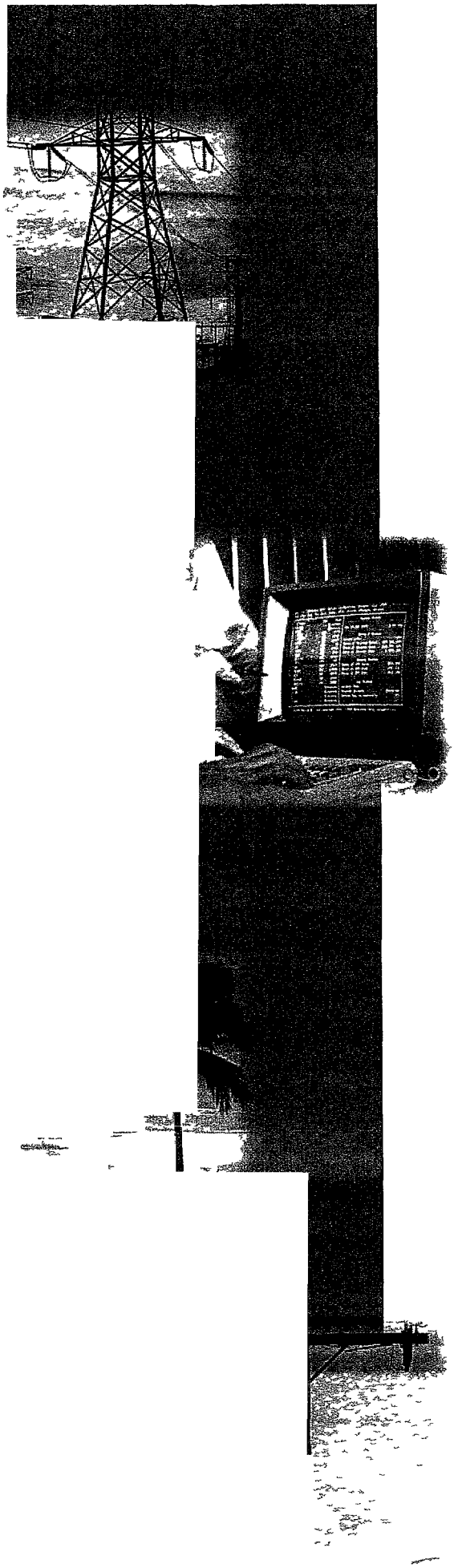

Energy Conservation Commercialization Project

Project Design Document

May 30, 1998

Prepared for
USAID/New Delhi

Prepared by
Hagler Bailly Services, Inc

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ENERGY CONSERVATION AND COMMERCIALIZATION PROJECT

Prepared for

USAID/New Delhi
Office of Energy, Environment and Enterprise

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ACRONYMS

ADB	Asian Development Bank
APL	Adaptable program lending
ASCI	Administrative Staff College of India
ASEAN	Association of Southeast Asian Nations
Assocham	Associated Chambers of Commerce and Industry of India
BEE	Bureau for Energy Efficiency
BIS	Bureau of Indian Standards
CERC	Consumer Education Research Center
CHT	Center for High Technology
CII	Confederation of Indian Industries
COP	Chief of Party
CPWD	Central Public Works Department
CRISIL	The Credit Rating Information Services of India Ltd
DCA	Development Credit Authority
DSM	Demand-side management
E3	Office of Energy, Environment, and Enterprise
ECA	Energy Conservation Act
ECO	Energy Conservation Commercialization Project
EDA	State Energy Development Agency
EMCAT	Energy Management Consultation and Training Project
ESCO	Energy services company
ETP	Energy Training Project
GDP	Gross domestic product
GEP	Greenhouse Gas Pollution Prevention Program
GHG	Greenhouse gas
GOI	Government of India
GW	Gigawatt
hp	horsepower
HVAC	Heating, ventilation, and air conditioning
ICICI	Industrial Credit and Investment Corporation of India, Ltd

IDBI	Industrial Development Bank of India
IFCI	Industrial Finance Corporation of India
IL&FS	Infrastructure Leasing & Financial Services, Ltd
IPP	Independent power producer
IREDA	Indian Renewable Energy Development Authority
IRP	Integrated resource planning
kV	kilovolt
kWh	kilowatt-hour
LOE	Level of effort
LT	Low tension
M&V	Measurement and verification
MOP	Ministry of Power
MW	Megawatt
NABL	National Accreditation Board for Laboratories
NGO	Non-government organization
NREL	National Renewable Energy Laboratory
NTPC	National Thermal Power Corporation
PACER	Program for Acceleration of Commercial Energy Research
PCRA	Petroleum Conservation Research Association
R&D	Research and Development
R3	Regulatory Reform and Restructuring
SEB	State electricity board
SEEF	State Energy Efficiency Financing scheme
SERC	State Energy Regulatory Commission
SO	Strategic objective
SPSR	State power sector restructuring
TA	Technical assistance
T&D	Transmission and distribution
UL	Underwriters Laboratory
USAID	U S Agency for International Development

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CHAPTER 1
INTRODUCTION

1.1 BACKGROUND

India's vision for the 21st century is centered on accelerating economic growth through consensus building within a democratic framework The energy, power and irrigation sectors have been accorded importance in the future, with the state governments and public/private entities playing a key role in investment planning and ownership, as opposed to the central government This transition in responsibility is matched by an emphasis on programs that address the efficient supply and use of energy, particularly electricity

The following discussion describes recent trends in the power, financial services, industrial, and the efficient end-use equipment sectors Subsequent sections describe the role of USAID, the World Bank and Asian Development Bank in India's power sector, as well as recent energy efficiency trends in other countries

The Power Sector Inadequate and inefficient power supply characterize India's power sector Overall, peak capacity and energy shortages are estimated to be over 20% and 15%, respectively (in individual states such as Haryana, these shortages are as high as 30-40%)

Transmission and distribution (T&D) losses are quite substantial in India compared to other countries [1] Historically, T&D investments have lagged those in power generation, resulting in the distribution network's under-performance Recent studies show that at least 1-2% of national GDP is lost because of poor quality or unavailable energy

Supply-side problems have been exacerbated by inefficiencies on the demand side On the demand side, inefficient pricing and a variety of market and non-market barriers to energy efficiency have resulted in the highly inefficient end-use of electricity

[1] According to official estimates, in 1980-81 T&D losses accounted for 20 6% of the total electricity available, in 1993-94 the losses are reported to be 21 4% Commercial (or non-technical) losses (e g pilferage) accounted for a significant portion of these losses Source Power & Energy Division, Planning Commission, Government of India *Annual Report on the Working of SEBs & Electricity Departments* February 1997

The sector is plagued by major revenue shortfalls due to low tariffs, heavy cross-subsidies, and extremely poor collection performance The share of the domestic and agriculture sectors in total power sales increased from 27 4% in 1984-85 to 47% in 1995-96, while that of industry declined from over 50% to about 35% This has implications for the profitability of the state electricity boards (SEBs) because the tariffs for the agriculture and domestic sectors are lower than the cost of supply [2] For instance, although the agricultural sector accounts for 38% of the total electricity use in Andhra Pradesh, the revenue realized on agricultural electricity sales is barely 3% of the total The sector's heavy reliance on increasingly tight state budget resources has constrained power expansion and systems upgrading

The cause of this situation (which is now universally recognized by Indian policy makers) is the pervasive politicization of many decisions affecting a majority of Indian SEBs' operations and expansion, and the attendant lack of a commercial outlook in their functioning Most states have regarded SEBs as extensions of the government and exerted influence over their tariff, operational, personnel, procurement and investment decisions to advance their own political objectives As a consequence, SEBs have been required to charge low tariffs to agricultural and residential consumers, and to undertake activities on behalf of the state governments without proper compensation

The 1991 Government of India (GOI) reforms specifically targeted India's power sector, which resulted in a series of legislative changes that allowed the entry of foreign independent private power into the country Since then, more than 6 GW of capacity have been added nationwide, and 11 privately owned power stations selling to the grid have been commissioned, with a total generation capacity of nearly 2,000 MW More than 1,400 MW of majority foreign owned and developed projects will be operational by the end of this year, and another 4,300 MW are under construction [3] The entry of independent power producers has also forced the government to evaluate a number of other related sectors more closely the fuel sector (imports of naptha and coal are possible), the financial sector (a number of new concepts such as project finance have been mainstreamed), and the transport sector (transportation arrangements are now permitted)

In the last five years, USAID, the World Bank and other donors have made the design and implementation of energy efficiency and demand-side management a priority at utilities and among end-users These efforts have led USAID to develop supply- and demand-side energy efficiency efforts focused on implementation at public (The National Thermal Power Corporation as well as SEBs such as Haryana State Electricity Board) and private utilities (Ahmedabad Electricity Company and the Bombay Suburban Electricity Services Company)

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2 Ibid

3 Ministry of Power, Investment Promotion Cell, March 9, 1998

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The Financial Services Sector Three all-India term-lending institutions (ICICI, IDBI and IFCI) with total assets in excess of $25 billion dominate India's term lending market They provide medium- and long-term financial assistance to the private sector for new, retrofit and expansion projects Both ICICI and IDBI have experience with energy efficiency and R&D-based venture capital (e g , USAID's PACER Project)

However, the rise of commercial banks, urban non-bank finance markets, and the rural credit system can help expand the energy efficiency market The urban non-bank finance market consists primarily of finance, hire-purchase, and housing finance companies Their mostly consumer oriented market has expanded very rapidly and now captures more than 10% of total deposits in the banking sector

The changes in the Indian consumer sector have been most dramatic Reduced import tariffs, rising incomes, and the increase in consumer financing have opened a number of marketing channels and financing methods previously unavailable to producers and providers of energy efficiency services The equipment leasing market is estimated at $500 million and is growing by at least 12% annually The number and depth of credible players is large, but some consolidation has occurred due to regulatory pressures

The Industrial Sector While the government has placed a good deal of importance on the industrial manufacturing sector by providing it with specific growth incentives, the services sector has contributed more to GDP Industry grew by 5 5% between 1975-1985 and 6 7% between 1986-1996, with a peak growth of nearly 13 6% in 1995 Despite these growth rates, the industrial sector is constrained by poor infrastructure, difficulty in accessing efficient production technologies, ineffective management, high factor prices, and labor rigidities

% of GDP	1975	1985	1995	1996
Industry				
Manufacturing Sector	16 7	17 9	19 7	20 1
Services	35 8	38 1	42 1	43

Source The World Bank, Country Assessment Study, December 1997

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With the de-licensing of the industrial sector, market forces are increasingly felt in such industries as steel, petrochemicals and automobiles Investment in new, efficient plant and machinery has occurred, but has lagged that elsewhere in Southeast Asia Further, large sections of the industrial sector remain unaffected by tariff reductions, imports and improvements in manufacturing technology This trend is especially true in the cottage and small- to medium-size industrial enterprises

The Efficient End-Use Equipment Sector Despite years of oil and electricity conservation efforts, India's electricity intensity (the electricity consumed per unit of GDP produced) remains very high – for 1996/97 it was 0 91 kWh/US$ of GDP This intensity is one of the highest in developing Asia and almost twice that of Taiwan and Malaysia

Until now, superior quality end-use equipment (such as lighting products, pumps, motors, compressors, furnaces, air-conditioners and refrigerators) has not generally been available in India, which has imposed a severe constraint on the provision and efficient use of energy, particularly hydrocarbons and electricity Compounding this problem has been the entry of cottage and small-scale enterprises that manufacture electrical and electronic equipment (e g , ballasts, fractional hp motors, appliances, burners, kilns, heaters)

Many of these manufacturers produce goods that are not branded or certified with respect to performance, energy consumption, safety and reliability – their major selling point is their low capital cost and quick repair response time Also because they lack economies of scale in production, the owners are often unable to invest in proper manufacturing and testing facilities These trends have made significant contributions to the poor performance of a high proportion of the end-use equipment currently in service They have also contributed to the other problems faced by the present transmission and distribution system, especially high harmonic content and high reactive energy losses

1 2 USAID OPERATIONS IN THE INDIAN POWER SECTOR

USAID's technical assistance to the Power Finance Corporation, state electricity boards, and private power companies has helped leverage millions of dollars of loans from the World Bank and the Asian Development Bank Specifically, technical assistance to the Government of India for the development of standardized legal and financial documents, and training in support of regulatory and policy reforms, have helped open the way for millions of dollars of potential U S investment in private power generation USAID grants and technical assistance aimed at supporting renewable energy technologies have contributed to an increase in the share of power generation from renewable energy sources from 0 2% of total power generating capacity in

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March 1994 to over 1% in March 1996 The signing of partnership agreements between leading Indian and U S power utilities under the USAID-funded Utility Partnership Program has established a long-term mechanism for transfer of U S technology and experience to Indian utilities USAID assistance also facilitated the signing of the first small hydropower purchase agreement between the Uttar Pradesh SEB and a private hydro power consortium lead by a U S hydro power developer, paving the way for rapid development of 10,000 MW produced by small hydro power plants in India

USAID has three major activities focused on achieving increased financial and environmental sustainability in the energy sector Working with major development banks, the Energy Management Consultation and Training (EMCAT) project uses a combination of technical assistance and training to address the critical issues affecting the Indian power sector identifying and supporting policy reforms related to power sector regulation and restructuring, increasing investments in energy efficiency and demand-side management, and promoting innovative financing of energy efficiency projects The Program for Acceleration of Commercial Energy Research (PACER) works through a major development financial institution to provide conditional grants for market-driven research to develop energy-efficient and renewable energy technologies that have potential for near-term commercial success The Greenhouse Gas Pollution Prevention Project (GEP) combines the strengths of Indian industry with the technological prowess of the United States to reduce greenhouse gas emissions by facilitating investments in advanced coal combustion technologies and bagasse cogeneration, and providing specialized technical assistance for efficiency improvement in existing coal-fired power plants

1 3 WORLD BANK OPERATIONS IN THE INDIAN POWER SECTOR

During the 1980s and early 1990s, the Bank followed a three-pronged approach in the power sector 1) support to central government-owned agencies as a means of effecting sector-wide improvements, 2) financing the investment needs of a number of SEBs, and 3) financing existing private power utilities The success of this strategy was mixed The technical and financial performance of central and private utilities was generally satisfactory, but efforts to revitalize the institutionally weak SEBs proved infeasible Admittedly there was no effective mechanism to elicit their cooperation or enforce compliance with the Bank's legal covenants, specifically those related to pricing and tariff structure Three loans to SEBs were canceled Only $400 million was actually disbursed out of the total commitment of $1 8 billion to SEBs from FY84 to FY93

In the early 1990s it became evident to the Bank that in the absence of major structural and regulatory reforms, particularly at the state level, improvement in SEB performance was neither possible nor sustainable A concerted effort was made in 1993 to address the root causes of SEBs' lack of creditworthiness In October of that year, a collaborative GOI/Bank initiative was launched at the conference on Power Sector Reforms The GOI subsequently sought Bank

assistance to prepare State Power Sector Restructuring (SPSR) projects in Bihar, Haryana, Rajasthan, Uttar Pradesh and Orissa Of these, only Orissa's reform program reached a stage of readiness for Bank financing in the FY95-97 period (the Orissa SPSR loan for $350 million was approved by the Bank's Board in May 1996) In January 1998, the Haryana SPSR was approved under the Bank's new lending mechanism, the Adaptable Program Lending[4] (APL) instrument The first Haryana APL is for $60 million and is expected to cumulatively amount to $600 million over the next ten years

Currently the states of Andhra Pradesh and Karnataka are among the most likely to adopt and pursue sector reforms Progress in the states of Bihar, Uttar Pradesh and Rajasthan has been sporadic

Advancing DSM in State Power Sector Reform Programs Even with the implementation of the planned reforms, transmission and distribution upgrades, and the purchase of additional power from independent power producers (IPPs) and central/regional utilities, the unsatisfied demand for electricity in most Indian states will persist for many years Any demand-side efficiencies, load shape modifications, or increases in cogeneration that can be achieved cost-effectively through DSM programs will be beneficial to Indian SEBs and their successors Recognizing this, the Bank decided in late 1994 to explore the commercial possibility of DSM investments as a component of the SPSR program The goals of the SPSR's DSM programs is to

- generally improve electricity availability by reducing losses and improving overall efficiency across all sectors (e g , industrial, agricultural, commercial/residential, municipal) and time periods through end-use customer electricity efficiency
- keep the load shape as flat as possible during the removal of curtailments, through the use of efficiency measures for selected customers, innovative tariffs and other load management measures
- utilize customers' on-site generation (including cogeneration) to reduce power shortages and add power quality equipment (capacitors, transformers, and voltage regulators) to improve power quality

[4] The APL is the new approach to support power sector reforms With the APL, the Bank will enter into a long-term agreement with the state, indicating its readiness to provide financial assistance to support far-reaching reforms over an extended period An initial small loan will be extended to initiate the reform process, implement critically needed investments, strengthen political ownership and build wider public support for the program Subsequently, a series of larger loans will be provided based on the progress achieved in implementing the reform and investment program

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- increase revenues by using savings from low-tariff sectors to meet unsatisfied demand in high-tariff sectors

The Bank has sought to achieve these broad DSM program goals through a variety of energy efficiency and DSM activities The actual mix of the DSM program elements varies from state to state and utility to utility, depending on their characteristics, including consumption by sector, SEB load shape characteristics, and the nature and profile of energy efficiency service providers available

The Bank's Experience in DSM/Energy Efficiency in India Over the past few years, the Bank has been developing investment projects in energy efficiency/DSM in several states as part of the SPSR program Its approach involves creating the technical and institutional capacity within a utility to develop, design and implement DSM projects in end-user facilities, create a load research function and organization, develop and implement fast-track DSM pilot demonstrations, and design appropriate financial intermediation structures and procedures

The DSM project development process is part of the project identification and preparation activity of the SPSR and is conducted through a carefully sequenced design approach, followed by an implementation strategy The elements of the design and implementation approach are provided below

DSM Design and Implementation Approach in World Bank Projects in India

STEP 1 ASSESSMENT
- Situational analysis (utility load shapes, demand forecasting, existing tariff structures, supply-side load management measures, utility power restriction and curtailment policies)
- Sector/end-use data analysis and DSM options screening
- Pre-feasibility studies of key DSM measures

STEP 2 PREPARATORY STUDIES
- Institutional analysis of utilities and energy efficiency service providers (audit companies, vendors, energy service companies, etc)
- Investment studies of screened DSM options
- Financial intermediation strategies (utility financed, state government financing, national and state development finance institutions, ESCOs/private sector)
- Donor coordination for technical assistance
- Workshops to communicate findings

STEP 3 APPRAISAL AND NEGOTIATION
- DSM program definition as part of SPSR program
- DSM investment planning in the Bank's APL process
- Negotiation of DSM investment and program package

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STEP 4 SUPERVISION

- Donor-financed technical assistance for capacity building (DSM cell, etc)
- Design of investment projects (in end-user facilities, by ESCOs, etc)
- Development of load research function (in coordination with metering)
- Appraisal and financing (through development finance institutions and others)
- DSM project implementation
- Monitoring and verification

This general sequence of steps was developed based on experience in Orissa, Haryana and early preparatory work in Uttar Pradesh, Rajasthan and Andhra Pradesh The table below shows the current status of the Bank's and other donors' DSM programs

Current Status of Donor-Sponsored Energy Efficiency Activities in India

Entity	Status	Primary Activity	Project Size (US $ Million)
Orissa Grid Corporation	Loan approved 1996, detailed project feasibility and supervision underway Principal donor DfID, UK	DSM capacity building, load research, investment in municipal water, industry, non-sugar cogeneration, fuel substitution, and ESCO projects	97
Haryana Electricity Board – APL	Loan approved December 1997, APL-I under implementation, DSM project identification underway Principal donor USAID	DSM capacity building, agricultural DSM, biomass cogeneration, regulatory reform, distribution systems	35
Rajasthan Electricity Board – APL	Preparation underway Principal donor CIDA	Pilot projects in RSEB model division technical, managerial and financial performance	7 5
Indian Renewable Energy Development Authority	Loan negotiations planned for April 1998 Principal donor World Bank/GEF	Technical assistance, ESCO financing, end-use efficiency equipment financing	30 (loan funds) 5 (technical assistance

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Entity	Status	Primary Activity	Project Size (US $ Million)
IREDA-I & II			funding)
Andhra Pradesh Electricity Board AIJ project	Project preparation underway Principal donor Norway AID	Agricultural pilot project design and implementation	5

With close to $130 million committed or under negotiation for demand-side management, the Bank's interest is in seeing these projects reach financial closure and provide tangible system benefits as soon as possible The Bank has also identified IREDA, a successful promoter of renewable projects, to become involved in energy efficiency

1 4 ASIAN DEVELOPMENT BANK OPERATIONS IN THE INDIAN POWER SECTOR

The Asian Development Bank (ADB) has focused its power sector restructuring and energy efficiency efforts at the state level (Gujarat and Madhya Pradesh) and on assistance to development finance institutions (IDBI and ICICI) In an approach similar to the World Bank's, the ADB is concentrating on first improving the commercial viability of the SEBs Several studies are underway, including evaluating the feasibility of distribution privatization (Gujarat) and utility master plan preparation

Since 1995, the ADB has also provided IDBI with a $150 million line of credit for term lending to energy efficiency and modernization projects sponsored by creditworthy industrial companies As of March 1998, nearly $65 million has been disbursed and all of its credit line has been committed to industry projects (e g , cement, sugar, iron & steel) A second line of credit is under discussion with possible mobilization next year

1.5 RELEVANT TRENDS IN OTHER COUNTRIES

Many countries, especially those that have experienced strong economic and accompanying energy consumption growth, have embarked on re-vitalizing their energy efficiency rules and regulations, incentives and government organizations Even previously socialist (or communist) countries are seeking market-led energy efficiency programs as part of their drive to increase

efficiency While market forces will increasingly shape U S DSM programs, many other countries have embraced the initiative of the private sector in providing solutions where regulatory drivers have failed

United States The U S electricity market is in the midst of making a major regulatory change towards a market-based approach with retail competition As a result, there will be significant changes in the way utility DSM activities are financed, structured and delivered It is still too early to tell, but most DSM activities are likely to be folded into on-going utility-customer relationships These relationships are the result of increased attention to marketing, power brokering, and energy service companies The new energy retailers can be expected to offer their customers packages of services and products that include electricity, financial products to hedge electricity uncertainties, and expanded facility energy management Also, DSM services will be competitively marketed as a means of helping customers to manage their utility bills

In 1995, 1,053 of the U S 3,199 electric utilities reported having DSM programs, producing energy savings of 57,421 million kWh, and 29,561 MW of actual peak load reduction, at a cost of nearly $2 4 billion

China The need to improve the efficiency of end-use in parallel with the development of new energy supply has been a cornerstone of China's energy policy for the last 15 years The Chinese government is committed to the large-scale implementation of supply, distribution and end-use efficiency Interestingly, improving energy efficiency is a major pillar of China's environmental protection strategy, especially as a means of abating local and regional air pollution and increases in greenhouse gas emissions

During the 1980s, China developed a comprehensive energy conservation program, including major policy directives, procedures, regulations, technical assistance and financing programs With the rapid movement towards a market economy, China now supports a market-based energy efficiency solution Today, this program is among the most extensive in the world

Major reforms in retail energy pricing (petroleum and electricity) begun in the late 1980s and have resulted in average energy price levels at or above the cost of supply As a result, energy conservation investments have a high propensity for market-acceptable financial rates of return

South East Asian Nations All ASEAN countries embarked on power sector and energy pricing reform during the late 1980s Since then, the larger of these countries have introduced independent power, greatly reduced distribution losses, and instituted polices that have brought in a wave of investment in energy efficient end-use equipment (e g , refrigerators, T-8 lamps,

HVAC systems, motors) In the context of this project, the Thailand experience is worth reviewing

In 1992 Thailand approved legislation establishing the Energy Conservation Promotion Act, which increased the government's commitment and resources to implement a comprehensive energy efficiency program The Act gave the Department of Energy Development and Promotion major responsibilities in energy conservation and the authority to issue voluntary building energy codes and appliance efficiency standards It also identified a class of customers that are "designated facilities", these facilities are required to have energy managers, conduct energy studies, and develop and implement energy efficiency plans Also, the Act allowed for the creation of an Energy Conservation Promotion Fund to be financed by taxes on refinery products sold in Thailand

The Act provided the framework and incentives for energy efficiency projects, but the result was quite different from what the government expected Despite the market orientation of the Thai economy, very few energy conservation projects have been concluded Most analysts now agree that the market did not take off because 1) the Act and its implementing procedures were too restrictive for a "market-based" solution, 2) disbursement issues and accompanying delays provided little incentive to energy service providers, and 3) the energy distribution utilities delayed their involvement until recently, thereby slowing the implementation of demand-side measures

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CHAPTER 2
ECO PROJECT DESIGN OVERVIEW

2 1 PROJECT PURPOSE AND DESIGN PRINCIPLES

The Energy Conservation and Commercialization Project (ECO) is intended to serve several broad purposes for USAID/India

- Engage India more broadly in global climate change actions through win-win energy sector programs, policies and projects
- Provide a flexible, long-term contractual vehicle to permit the Mission to continue its highly successful efforts to reform and improve the efficiency of India's energy sector, particularly the power sector
- Achieve increased environmental protection in energy, industry and cities (SO4) by reducing energy waste and improving the efficiency of energy supply and use
- Aid India's economic liberalization process by promoting market-oriented solutions to energy sector problems, particularly the need for increased energy efficiency
- Leverage World Bank and other donor funding through close collaboration in project design and implementation, leverage private sector investment through market-based approaches to energy efficiency project development, financing and implementation
- Assist in implementing President Clinton's Climate Change Action Plan by creating a policy and market environment in India that achieves significant greenhouse gas (GHG) emissions reductions through more efficient energy production and use

These broad purposes were stated in the project design terms of reference and were presented again to the design team upon their arrival in a presentation by the Office of Energy, Environment, and Enterprise (E3) staff Based on the broad purposes of the project, the design team formulated a set of "guiding principles" that it used to guide the design effort These principles were continually reexamined throughout the design process to confirm their relevance to the current status of energy efficiency in the India In brief, the guiding principles that met the project purpose and found relevance in the India context were as follows

Guiding Principles for ECO Project Design

Commercialize Energy Efficiency – Although the primary focus of the ECO project is the commercialization of energy efficiency, the design team continually tested whether, in fact, both the public and private sectors were ready to move in this direction If, for example, the team had found that government leaders were still opposed to working collaboratively with the private sector, or would not support market-oriented policies and programs for improving efficiency, the team might have had to propose a strategy resting more heavily on government action However, they found that top government leaders readily understood the need to work more closely with the private sector and intense discussions were already underway regarding how to improve the nation's energy efficiency through more market-oriented approaches Discussions with energy efficiency businesses, financial institutions and others also confirmed that the nation is ready to make a major commitment to achieving greater energy efficiency through market-oriented approaches Thus, the design team confirmed the soundness of this basic guiding principle for the ECO Project The team also confirmed two subordinate principles

- *Assist government agencies in developing market-oriented solutions* – Although many government leaders understand the need to rely increasingly upon the private sector to implement energy efficiency, there is little understanding of the policy and programmatic mechanisms to give incentives to the private sector to do so Thus, an important design principle for ECO is the need to provide technical assistance and training to various government agencies to help them create a market environment conducive to investment in efficiency

- *Strengthen private sector capability to commercialize energy efficiency* – Although India has a well-developed energy auditor industry group, the ability of these firms to implement their recommendations through commercial projects is very limited Thus, training and TA must also focus heavily on strengthening the ability of firms to make a viable business out of capturing energy cost savings

Focus on the Power Sector – The Indian power sector continues to be a major constraint to more rapid economic growth Poor power quality and reliability rob the economy of one to two percentage points of GDP growth each year USAID and other donor agencies have invested heavily in the past decade to help improve the management and efficiency of the sector, but much more needs to be done The ECO Project will enable the mission to continue its efforts at power sector regulatory reform and restructuring, and thus must remain a guiding principle in project design However, the current situation suggests a shift in emphasis

- *Shift emphasis from supply to T&D and DSM* – There is a broad realization emerging in India that opening the power sector to independent power producers alone is not a complete solution to the sector's problems Indeed, private power development will continue to proceed slowly as long as enormous inefficiencies exist in power distribution and use For

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example, technical and non-technical distribution losses in New Delhi are estimated at 50%, many other areas have losses between 25-40% This not only wastes power from the new IPPs but it also greatly reduces revenues to the SEBs, thereby increasing payment risks to both existing and new power developers Solutions to the more efficient distribution and use of power can be complex, including the privatization of the distribution systems Thus, training and TA to what is now the weakest link in the power system chain should be a guiding principle for ECO

Cross Cutting Design Principles – The following principles also informed the project design process

- *Reduce GHG Emissions* – Reductions in GHG emissions is one of the basic purposes of ECO and a primary performance indicator

- *Build on successful USAID/India efforts* – USAID/India has had many successful energy programs including PACER, EMCAT and GEP A guiding design principle is to build on what has worked before in India, and continue successful programs currently underway, particularly the R3 efforts and the broad power sector reform training being conducted under the Energy Training Project (ETP)

- *Coordinate and support the World Bank programs* – The ECO project can play an important role in assuring the success of the World Bank's current and future efforts to promote energy efficiency/DSM and reform the power sector The Bank recognized the potential for such a collaborative role by providing a full-time member of the design team, Mr S Padmanaban

- *Promote business demonstrations, not technology demonstrations* – The design team found that lack of familiarity with energy efficiency technologies was not a critical barrier to energy efficiency in India The technologies exist and are known within the industry The key barriers at the present time come from the inability to commercialize existing technologies Thus, the ECO Project must focus on demonstrating new business strategies and approaches, innovative financing techniques, and improved project identification and development to the business community in order to reduce business risks and accelerate the commercialization of energy efficiency

- *Results oriented implementation driven* – With a focus on turning energy efficiency into a viable business proposition, it will be critical to demonstrate to business leaders actual commercial projects The ECO project should focus on getting commercial projects financed and installed and achieving real GHG emission reductions

- *Identify training needs* – Training will be a fundamental part of the process of commercializing energy efficiency As part of each activity, the design team made a

concerted effort to identify the training that would be needed to complement the technical assistance

2.2 THE DESIGN PROCESS

The design team used an iterative process of interviews and focus groups, followed by synthesis sessions to review and consolidate findings, confirm guiding principles, and identify opportunities for intervention, formulate activities, and identify potential counterparts As activities and counterparts were identified, they would then be tested in subsequent interviews Over the three-week design period, ideas were tested and retested until they achieved a level of support among the entire team sufficient to warrant being included in the project design

Overall, the design team held over 45 formal interviews and one focus group session with private firms involved in the energy efficiency business Interviews were held with all sectors including government (e g , Ministry of Power, Ministry of Petroleum and Natural Gas, Petroleum Conservation Research Agency, Energy Management Center, National Productivity Council), trade associations (e g , Assocham, CII), financial community (e g , IDBI, ICICI, IL&FS, CRISIL, Kotak Mahindra), ESCOs (e g , EPS/Thermax, Intesco, Saha Sprague), private firms (e g , 3EC, Newtek, Mega Power), equipment manufacturers, end users, SEBs and USAID contractors Results of the interviews and focus group are available in the design team's trip report

Market Test – Given the goal of commercialization, all project ideas were filtered through a "market test " This amounted to questioning whether the proposed activity used or promoted a market-based solution sufficient to move the market toward greater investment in energy efficiency As can be seen in the proposed project activities in Chapter 3, some of the tasks involve regulatory actions such as mandatory appliance energy labeling or minimum appliance efficiency standards These were felt to be critical opportunities for intervention that presented themselves now and for the foreseeable future However, even in these cases, the tasks are oriented toward helping the measures achieve maximum impact by supporting market-based programs in parallel with the government regulation, thereby minimizing the need for government inspection and enforcement by maximizing private sector cooperation

Wedge Issues/Opportunities for Intervention – A key part of the design process was identifying opportunities for intervention or "wedge issues," i e , issues which provided an opening for technical assistance or training to promote new market-oriented policies or programs The wedge issues were tested in the same iterative process described above until a consensus emerged regarding their importance The wedge issues/opportunities for intervention then became a key input into designing specific activities and tasks to be included in the project The wedge issues/opportunities for intervention identified by the design team are described below

Wedge Issues/Opportunities for Intervention in India

- Climate change — The climate change issue is providing a new impetus to examine energy efficiency as a low-cost means of reducing GHG emissions Progress on the proposed flexible mechanisms such as emissions trading and the Clean Development Mechanism will create a strong additional, possibly global, market driver for investments in energy efficiency

- Power sector reform — Power sector reform offers a window of opportunity to incorporate energy efficiency policies throughout the reformed structure, from tariff design to licensing conditions for the privatization of distribution systems

- Emergence of nascent ESCO industry — Existing ESCOs are seeing business begin to improve and new ESCOs are beginning to form

- Increase in private sector project sponsors

- Market-oriented government institutions — Several energy-related government institutions are shifting to a more market-oriented approach to achieving their goals These include the PCRA, the Ministry of Petroleum, IREDA, and the Ministry of Power (MOP)

- Increased government willingness to work with the private sector

- Increased demand for reliable and quality power by consumers accompanied by the willingness to pay for it

- Policy makers increasingly seeing a link between improved energy efficiency and increased power quality and reliability Unstable line voltages undermine attempts to improve end-use efficiencies and offer a major opportunity to improve distribution efficiency

- Bureau for Energy Efficiency (BEE) legislation — The possibility of a major national energy conservation bill leading to the establishment of an apex agency for efficiency provides a unique opportunity to direct national energy conservation policy towards more market-oriented approaches

- CERC/SERC legislation — This major power sector legislation provides an opportunity to bring market-oriented solutions into power sector reform

- Privatization of distribution — The current debate, e g , the Coelho Report, provides an excellent opportunity for intervention to structure power distribution such that it is a major market player in energy efficiency

- Increased availability of energy efficiency products due to reduced import duties — In just the past year, reduced import duties have led to an influx of branded products with improved quality and energy efficiency over locally manufactured products

- IPP projects are coming on line more slowly than expected — This is causing SEBs and policy makers to examine opportunities for energy efficiency improvements to help them meet demand, and possibly at lower cost than new power plants

- High value of electricity in a shortage situation — The most expensive energy is no energy Industries, farmers and businesses place a very high value on power availability This creates a strong market for energy efficiency

- Growing realization that inefficiencies in the distribution system and collections are dragging down the entire power system, including slowing the development of private power and power sector reform

- Rise in consumer financing and new consumer product distribution channels — These developments offer new points of intervention to bias consumer purchases toward more efficient products

- Growing MDB support for energy efficiency investments — Both the World Bank and the ADB have significantly increased lending in the past two years for energy efficiency This new availability of capital for financing efficiency projects will support the expansion and further development of the energy efficiency industry

- Broadened financing authority for USAID — The U S Congress has authorized the creation of a Development Credit Authority that can be used to lower risk by providing guarantees to loans This credit mechanism can be used to stimulate financing for energy efficiency

- Shift in power from the center to the states — This shift is exemplified by the creation of State Electricity Regulatory Commissions, which can provide an access point for interjecting energy efficiency policies

2.3 DESIGN CONCLUSIONS AND PROJECT STRUCTURE

The design team concluded that the focus on the commercialization of energy efficiency for the ECO Project is timely and meets fundamental needs within the Indian power sector Inefficiencies in the distribution and use of power are now perceived as the most critical barrier to further development and improvement of the sector, and the power sector is viewed as a major choke point to more rapid economic development for the country

Overall, the opportunities for intervention appeared to divide themselves into three areas government policy and institutional reform at the central level, policy and power sector reform at the state level, and market-based opportunities and needs throughout the economy These three areas, center, state, and markets, were viewed as complementary and synergistic, and thus essential components of the ECO Project Following on this conclusion, the project was structured around these three basic areas Component 1 of the project design is intended to aggregate those activities that take advantage of policy and reform opportunities and needs at the center A key opportunity for assistance at the center level identified by the design team is the proposed Energy Conservation Act (ECA) which is expected to be passed by Parliament The ECA will create a Bureau for Energy Efficiency (BEE), nominally within the Ministry of Power, which will have regulatory authority for minimum energy efficiency standards, appliance labeling, mandatory energy audits and auditor certification Helping the BEE develop its regulations with maximum involvement from industry and the use of innovative market-oriented approaches will be a key target for the ECO Project in order to help the new agency achieve maximum impact with minimum intervention into the marketplace

Component 2 will focus at the state level on power sector reform and incorporating energy efficiency policies throughout the reform process The bulk of the effort in this component will focus on a single state so as to achieve maximum impact and demonstration value The specific state will be selected subsequent to this design effort, although candidate states include Karnataka and Kerala, which are next in the pipeline of reform states for the World Bank The activities in Component 2 include the broad R3 efforts of the Mission under the EMCAT Project as well as the R3 training currently being done under the ETP project Specific activities that support World Bank reform efforts are also proposed The thrust of these activities is to incorporate energy efficiency into the reform process, focusing in particular on the distribution system and end use in the agriculture sector Training and technical assistance will also be needed to support the new State Energy Regulatory Commissions, particularly in the areas of tariff design and policies that prevent energy efficiency and renewable energy from becoming "stranded benefits "

The other major aggregation of opportunities and needs is in the area of markets strengthening businesses and financial institutions along the entire project development sequence, eliminating bottlenecks in the market chain for key high-efficiency technologies, and conditioning the marketplace to create stronger incentives for private investment in energy efficiency These activities are described in detail in Component 3, Chapter 3 The thrust of these activities will be actually to "do deals" that create business demonstrations of commercial projects in order to reduce perceived risk and educate entrepreneurs on how to make a viable business from energy efficiency A key element of this component will be the strategic use of USAID funds to create the business demonstrations through the use of mechanisms such as loan guarantees (using the new Development Credit Authority), conditional grants, interest buy-downs or other means In the project budget, $5 million has been set aside for this purpose

With respect to training, it was concluded that there should be essentially two types of training that which is closely integrated with the technical assistance being provided and more general training that is provided to participants throughout the country Often training is most effective when it is linked with actual work that is taking place The training receives immediate application, thus reinforcing the lesson, and the participants are better targeted, making the training expenses more cost-effective This was the rationale for identifying training to be directly associated with specific TA tasks

There is also a need to continue to conduct the broad R3 training that has been undertaken through the Administrative Staff College of India (ASCI) This training reaches a broader audience and is longer in duration (usually two weeks), and can therefore go into greater depth on a given subject The design team felt, however, that there should be a shift in emphasis in the R3 training from IPP and supply side-related issues to distribution, demand-side, and regulatory issues These would include, *inter alia*, training in the privatization of distribution systems, utility regulation, policies and techniques for incorporating energy efficiency into power sector reform, and the economic theory and practice of tariff design

It was concluded that the training budget should be 20-25% of the total $20 million (TA plus training) budget (i e , excluding the $5 million in financial incentive funds) Most TA projects have a lower percentage than this, but the need to continue comprehensive R3 training suggested a higher percentage in this case Overall, approximately $5 million has been budgeted for training, with slightly more than half going to broad R3 training and the remainder to training associated with the TA This latter training has been identified in each task described in Chapter 3

Finally, the three-part structure of the project – center policy, state reform, and efficiency markets – suggested to the design team three different locations New Delhi (center policy), a state yet to be selected, and Mumbai (markets) The rationale for this is that the primary counterparts for the center policy activities are in New Delhi, i e , the new BEE, the MOP, BIS, PCRA, NPC and other agencies The primary location for the state level power sector reform activities will be in the specific state selected And the primary counterparts for the market activities are in Mumbai, i e , IL&FS, the IDBI, and ICICI Mumbai is also the main hub in the country for private sector activity, and this component would be most effective by being located there

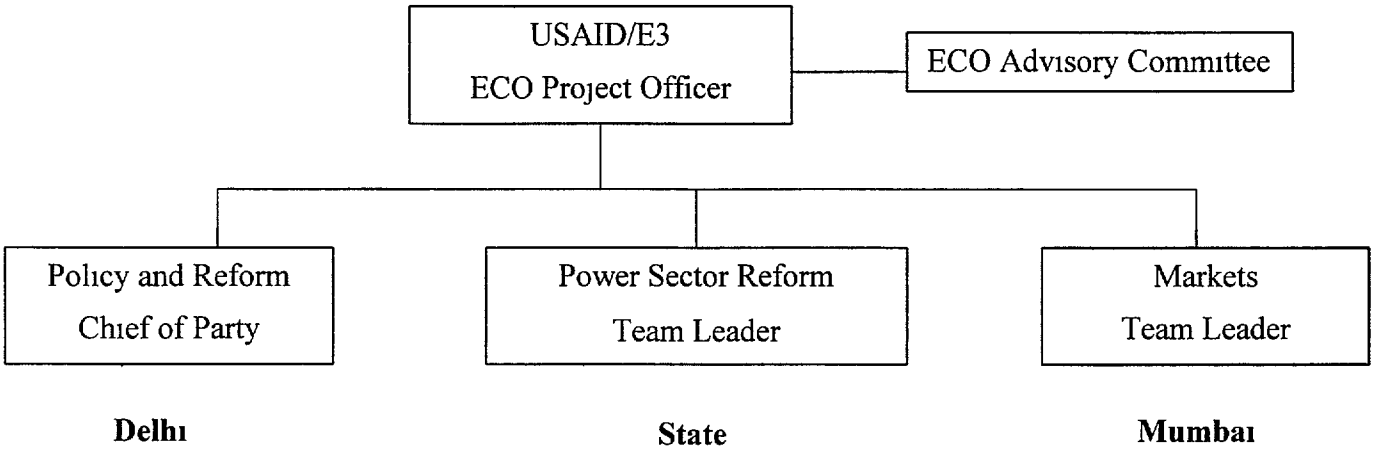
In order to provide overall project direction and coordination, the design team proposed a single Chief of Party to be located in New Delhi This position would run for the five-year duration of the project A markets team and team leader would be located in Mumbai The markets expat team leader would transition after three years to a CCN team leader The state level team would have a CCN team leader for five years The proposed ECO budget includes funds for three project offices, each located in close proximity to its counterparts This design was felt to be the

most cost-effective Project coordination can be achieved through regular communications, reporting and periodic meetings

Project Organization

The proposed three-part structure of the project will require mechanisms to coordinate and manage the three components to the maximum benefit of the overall project It is proposed that the three components be managed by a single project officer within the E3 office This person could be assisted by an advisory committee comprised of the MOP/BEE counterpart, the IL&FS and ICICI counterparts, an industry representative, and perhaps a consumer representative An overall project organization diagram is given below

ECO Project Organization



Chapter 3 provides a detailed description of the specific activities and tasks to be conducted under the ECO project In order to provide flexibility in implementation over the life of the project, the specific tasks are provided as indicative or illustrative of the types of tasks that could be carried out

Project Life

Communication with the Mission initially suggested a project life of seven to ten years Further discussions reduced this to seven years because it was felt that stretching the $25 million budget over 10 years reduced the level of effort (LOE) to below critical mass Upon further reflection, the design team has suggested a five-year life of project given a $25 million budget This duration is suggested based on the fact that $5 million has been set aside for financial incentives and another $5 million for training This leaves $15 million for a three-component project This is roughly $1 million per year for each component, which the design team felt was sufficient to achieve the objectives of the project

CHAPTER 3
ECO PROJECT DESIGN COMPONENTS

The ECO Project is comprised three components *Component 1*) market-oriented policy and institutional strengthening for energy efficiency at the center level, *Component 2*) power sector reform incorporating energy efficiency at the state level, and *Component 3*) business-oriented development of the energy efficiency market throughout the economy

3 1 COMPONENT 1: ENERGY EFFICIENCY POLICY AND INSTITUTIONAL REFORM

This program component is designed to assist government agencies and institutions in creating a supportive market environment for the commercialization of energy efficiency It will also provide targeted assistance to help agencies use market forces to achieve national objectives, including the reduction of greenhouse gas emissions Each of this component's four activities contains a number of tasks that describe the results and outcomes in greater detail

Activity	Description
1	Energy Efficiency Policy and Institutional Support
2	Energy Efficiency in Consumer Appliances
3	Energy Efficiency in Government Facilities and Private Buildings
4	Regulatory Reform and Restructuring

3 1 1 Activity 1 Energy Efficiency Policy and Institutional Support

The purpose of this activity is to assist the GOI in developing market-oriented programs and policies that enable the commercialization of energy efficiency It will provide institutional support for the proposed Bureau for Energy Efficiency (BEE) and will also transform existing GOI organizations, such as the Petroleum Conservation Research Association (PCRA) and Center for High Technology (CHT, which serves the public sector oil industry), into incubators and promotional agencies for energy efficiency businesses

The strategy will be initially to support the BEE in the development of new rules and regulations and the parallel development of supportive market-based programs This strategy will achieve maximum impact by using a blend of "carrot and stick" approaches such as minimum efficiency standards, energy audits, and other measures that will be supported by the market-based programs promoted in Program Component 3 Once the BEE has developed new rules and regulations, technical assistance will be provided to help it work with industry in developing market incentives, information programs and other efforts that promote voluntary, market-driven compliance with the efficiency regulations

The activity also will assist the BEE and other energy-related GOI agencies in reviewing existing GOI policies (e g , permitting 100% accelerated depreciation on energy efficiency equipment) and in updating these policies to take advantage of current and future market conditions Attention will be focussed in particular on the so-called flexible mechanisms under the Kyoto Protocol which could potentially bring in foreign direct investment in energy efficiency projects

Finally, institutional support will be extended to agencies that are motivated to develop and implement programs that help promote private energy efficiency businesses These organizations include the PCRA, CHT, the National Productivity Council, and others

Task 1 1 Support to the Bureau for Energy Efficiency

The GOI is drafting a new energy efficiency law (The Energy Conservation Act, or ECA) which will create an apex agency for energy efficiency within the central government The new agency, the Bureau for Energy Efficiency (BEE), will be nominally located within the Ministry of Power, although the BEE is intended to be an independent agency Parliament is expected to pass the ECA in 1998 or early 1999 and the BEE should then be operational by mid-1999 The legislation will authorize the BEE to set minimum energy efficiency standards on energy consuming appliances and equipment, issue energy audits for industry, and require the certification of energy auditors The legislation also permits BEE to carry out a number of other non-regulatory functions such as training, research and development (R&D), promotion, the provision of grants, and other functions that may be prescribed to it by the government

The BEE will require technical assistance for the formulation of policies, regulations, and programs that incorporate market forces to the maximum extent possible while minimizing government intrusion into the marketplace Potential areas of assistance include

- Providing strategic advice on developing market-based programs that support specific regulations
- Assisting the BEE take advantage of carbon emissions trading, the CDM and other flexible mechanisms as they are developed in order to promote greater investment in energy efficiency

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- Identifying key public and private organizations that might be targeted for energy audits and developing assistance programs for those organizations to finance and implement energy efficiency measures

- Developing a pilot program within the central government to test the feasibility of energy audits and retrofits before implementing such a program in the private sector

- Identifying energy efficiency R&D requirements and assisting in soliciting funds from donor agencies for implementation

- Developing a national energy efficiency plan that identifies market barriers to greater penetration of key technologies and makes recommendations to remove those barriers, possibly as a Technology Cooperation Agreement Pilot Project [1]

Associated Training

- *Workshop Voluntary Auditor Certification Program* A working group of ESCO trade association representatives, BEE officials, and industrial customers would be assembled to develop a certification program that meets or exceeds BEE requirements

- *Workshop Auditor Certification Training* This workshop will assist ESCO industry representatives in setting up energy audit training programs that meet the certification standards

Task 1 2 Energy Efficiency Policy Development

Whether or not the ECA is approved, there is a strong need for the continued development of policies to create a more favorable environment for investment in energy efficiency The Ministry of Power or other central and state agencies can assume responsibility for developing such policies This task will assist these agencies in identifying priority areas for policy development Illustrative areas for policy development include

- Reviewing the 100% accelerated depreciation for investments in energy efficiency

    - Determining the current level of awareness and use of the tax credit

    - Assessing the pervasiveness of false claims and the criteria used to determine which claims are legitimate

    - Establishing a committee to review and update the list of eligible equipment (the list has not been updated since 1980) and to continue the review process on an annual basis

[1] The TCAPP is a pilot program funded by the USDOE and USAID to explore the feasibility of Technology Cooperation Agreements as a means of gaining greater country and donor cooperation in developing and funding GCC related projects The TCAPP is being implemented by NREL

  - Establishing a marketing program for the depreciation policy and monitoring its impact

- Conducting a study of the problem of the use of multiple electricity meters in commercial establishments and its impact on the utility's rate base as well as efficient use of electricity, and recommend alternative solutions

- Assess the current impact and possible benefits of phasing out tax incentives and subsidies for low efficiency technologies

Associated Training

- *Workshop Financial Training for Accelerated Depreciation* This workshop will provide exposure to policy makers, manufacturers, end-users and their advisors on how to increase the potential for "correctly" utilizing the accelerated depreciation benefit for energy-efficient equipment purchases, including reviewing the equipment list specifying items that qualify for accelerated depreciation

Task 1 3 Institutional Transformation

A number of government organizations are increasingly working with the private sector to promote energy efficiency These include the PCRA and the NPC, and state energy development agencies (EDAs), among others This task will provide technical assistance and training to these organizations to increase their ability to encourage private energy efficiency businesses and solutions This task could also assist in transforming all or part of sufficiently motivated organizations into private energy efficiency businesses Illustrative tasks include

- Assisting the PCRA and other organizations to promote private sector, market-driven solutions to increased energy efficiency through

  - conducting demonstrations of innovative business and financing mechanisms for energy efficiency

  - identifying and promoting private energy efficiency businesses in the area of "horizontal technologies," e g , boilers and furnaces, steam systems, power factor correction, compressed air, lighting

  - identifying and promoting individual projects or aggregations of projects that could be implemented by energy service companies (ESCOs)

  - working with vendors to develop a practical set of technology upgrades that can be applied throughout specific business categories, such as glass manufacturing, steel re-rolling and aluminum die casting

- Helping the Center for High Technology (CHT, a refinery advisory group) to identify major energy efficiency projects in the oil refining industry and secure financing for implementation through ESCOs or other means

- Identifying and supporting one or more of the five state energy development agencies (EDAs) that are willing and able to promote energy efficiency businesses in their state

- Providing assistance throughout the project to the GOI and specific governmental energy efficiency organizations interested in privatizing their services

Associated Training

- *Course Industry-Specific Guidelines* Work with industry associations to deliver a course on energy efficiency methods and solutions to a group of industry owners and managers Many of these participants will come from small and medium-sized industry, and the courses will be held in areas where these industries are concentrated

- *Workshop Privatizing an Energy Efficiency Agency* This workshop will provide international case studies on developing business plans for an energy efficiency business for government agencies that may wish to privatize part or all of their energy efficiency operations The emphasis will be on training startup ESCOs, financing projects, and conducting market research

3 1 2 Activity 2 Energy Efficiency in Consumer Appliances

The purpose of this activity is to increase the average energy efficiency of consumer appliances such as lights, refrigerators, air conditioners and geysers (residential water storage heaters) through appliance energy labeling and minimum efficiency standards

Residential electricity demand is increasing faster than any other sector in India This is largely due to increased purchases of consumer appliances The overall strategy for the ECO Project will be to use market forces to increase the average efficiency of target appliances However, where market forces are weak or absent, government intervention in the form of consumer information or minimum standards will be supported

The strategy for this activity will be to encourage 1) "market push" strategies such as appliance labeling and minimum efficiency standards and 2) "market pull" strategies such financial incentives for high-efficiency appliances, government procurement policies, and possibly "golden carrot" awards to manufacturers to produce even more efficient appliances The three tasks under this activity focus on regulatory-based actions to implement "market push" strategies Overall, the approach will be to bias consumer choice toward more efficient appliances (Market pull strategies are discussed in Component 3)

Task 2 1 Appliance Labeling

Appliance labeling programs give consumers useful information on energy costs, they can also be used in calculating financial incentives to offset the higher costs of more efficient appliances This task will build upon the work being done under USAID's EMCAT Project, which is working to achieve a government/industry consensus on the format and content of the appliance

energy label The current approach is to develop an appropriate, common format for all appliances in order to facilitate consumer education and the label system's use If the EMCAT achieves government/industry consensus on the design of the appliance label, the ECO Project can focus on assisting the BEE in [2]

- Drafting the implementing regulations for appliance labeling
- Building a government/industry consensus for new appliances not covered by EMCAT
- Assessing the abilities of state agencies to monitor and enforce appliance labeling regulations
- Helping states, as needed, to develop their monitoring and enforcement capabilities for labeling requirements (e g , false claims on labels)
- Assisting the BEE in monitoring industry's compliance with the labeling programs and their impacts (e g , appliance manufacturers may be complying but the labels may not be changing consumer buying behavior, thus requiring further analysis of how to influence consumer purchasing habits)
- Working with NGOs, trade associations and consumer groups to increase consumer awareness of the energy costs of appliances, the environmental impacts of energy use, and how to use the label information to lower energy costs at home

Associated Training

- *Course Energy Efficient Product Labeling and Standards* Training will be required for the BEE staff, and possibly Bureau of Indian Standards (BIS), in appliance labeling The training should include a review of similar programs in other countries, drafting regulations, enforcement needs, and how awareness and financial incentive programs can improve the effectiveness of labeling programs The course can be modified and repeated for state implementing agencies, which will need training to implement the ECA, its regulations, and promotional activities The training can be done through the state EDAs, appliance retailers, consumer financing companies, NGOs and others
- *Workshop Marketing High Efficiency Products through Customer Awareness* This workshop will provide NGOs, trade associations, private firms, and other consumer organizations with information on designing and implementing consumer awareness programs The workshop will cover such issues as home energy use, appliance energy use, how to lower home energy costs through high efficiency appliances, and how to use appliance energy labels

[2] This assumes the ECA will be passed and that the responsibility for appliance standards will be given to the BEE rather than Bureau for Indian Standards

Task 2 2 Minimum Energy Efficiency Appliance Standards
Minimum efficiency standards will be used as a "market push" strategy to eliminate appliances at the bottom of the efficiency spectrum Developing efficiency standards typically is a long, slow, consensus building process and is often is not effective by itself in saving energy Standards must be supported by improved consumer information, awareness, and financial incentives to move the market Experience in other countries has shown that minimum standards can significantly affect an industry in terms of relative market share, competitiveness, and profitability Detailed information about the nature of the product market and the range of energy efficiency in each market segment is required in setting standards that eliminate products from the low end of the efficiency spectrum in each product category without significantly affecting competition and profitability within the industry

This task will build upon the work being done under the EMCAT Project, which is working with the BIS to upgrade India's voluntary minimum efficiency standards for refrigerators and air conditioners This task will improve the technical capacity of the GOI (BEE and/or BIS) to establish mandatory minimum energy efficiency standards for key appliances, most likely refrigerators, air conditioners and geysers Emphasis will be placed on increasing the GOI's understanding of appliance markets and the manufacturing industry, and developing standards that optimize efficiency gains while minimizing negative impacts on the industry Technical assistance will be provided throughout the consensus building process and will support the drafting of standards After the standards are promulgated, technical assistance will be provided to inform manufacturers, product distribution channels, and retail consumers about them Illustrative sub-tasks to develop the standards program include

- Developing a comprehensive strategy and plan for taking a market-oriented approach to the development and implementation of an energy efficiency standards program This approach should be based on
    - close cooperation with appliance manufacturers and retailers
    - detailed market analyses to minimize negative impacts on private industry while maximizing energy savings
    - private sector management of compliance testing
    - government certification of private testing firms
- Conducting a market analysis of selected appliance categories to determine the volume of sales, efficiency ranges, growth rates, and other relevant market and energy information for each category
- Assisting the GOI in informing manufacturers and retailers about the standards
- Helping the GOI to establish an enforcement program and monitor compliance

Associated Training

- *Workshop Consumer Appliance Efficiency Standards* This workshop will train BEE/BIS staff in the market and technical aspects of establishing minimum efficiency standards for refrigerators, air conditioners and geysers

Task 2 3 Appliance Energy Efficiency Testing

Facilities to test the energy efficiency of appliances are an integral component of any successful appliance labeling and standards program Testing facilities can be either publicly or privately owned For example, in the United States, the safety of all electrical equipment is tested by a private laboratory, Underwriters Laboratory (UL), and U S building codes specify UL certification for all electrical equipment Mexico's federal government certifies the eligibility of private testing laboratories to test the efficiency of appliances and other equipment Mexican regulations governing appliance efficiency require manufacturers to have their equipment tested in a certified laboratory and submit this certification to the government as proof that they are meeting the standard

EMCAT is providing approximately $200,000 to the Consumer Education Research Center (CERC) in Ahmedabad for appliance testing equipment This effort will provide an excellent foundation for consumer groups to use hard data in developing their positions on issues of appliance efficiency and informing consumers However, because the CERC is a consumer advocacy group, it is unlikely that either government or industry would view it as an objective, independent testing organization Thus, ECO should focus on establishing private, independent testing laboratories to support the labeling and standards program Illustrative tasks to be carried out include

- Working with the GOI (BEE or BIS and the NABL under the Ministry of Science and Technology) and private sector (e g , through Confederation of Indian Industry) to develop a plan for using independent, private firms to conduct testing in support of the appliance labeling and standards program The BEE or BIS would certify that the selected firms are qualified to conduct testing

- Conducting a promotional program to encourage private firms to enter the testing business and providing limited assistance to these firms where needed In addition, detailed specifications should be developed on what a firm needs in order to qualify as a certified testing lab

- Conducting a competitive solicitation for firms to provide testing services to manufacturers, reviewing bids for the GOI, and recommending firms to become certified testing labs

- Providing assistance as needed to selected testing firms This could include the provision of equipment or credit enhancements to finance the purchase of testing equipment

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- Assisting the GOI in monitoring the efficacy of the testing program This will include randomly procuring appliances on the open market and testing them for compliance

Associated Training

- *Workshop Appliance Efficiency Testing* This workshop will train BEE/BIS staff, in a fully equipped laboratory setting, on appliance efficiency testing This will ensure their familiarity with the testing equipment and procedures required for appliance efficiency testing The workshop can be modified and repeated for private testing firms certified as appliance testing labs to assure a high level and uniform understanding of testing procedures and issues

3 1 3 Activity 3 Energy Efficiency in Government Facilities and Private Buildings

The purpose of this activity is to improve the energy efficiency of government facilities, which will save taxpayers' money, and to use government procurement mechanisms as a stimulus to the energy efficiency market The energy efficiency of both government and private buildings will be improved through various programs and the promulgation of a building energy code

The strategy will be to target specific points of intervention within the government procurement process and policy — government-procured energy audits, retrofits of government buildings — to stimulate demand for high efficiency products and services For example, the GOI has already required the retrofitting of most trains with compact fluorescent lamps and electronic ballasts, thereby stimulating local demand for these products Similar actions by other government agencies, particularly the Central Public Works Department, which maintains most government buildings, could greatly influence the demand for efficient products, thus giving confidence to potential manufacturers who may wish to build local manufacturing facilities

The second part of the strategy will be to draft and promulgate a building energy code for both government and non-government buildings The code initially will be voluntary and can be used primarily as a tool for educating architects, engineers, and commercial developers on the benefits of energy-efficient building design Later in the ECO Project, the strategy will be to work with the BEE and selected state governments (building codes are issued and enforced at the state level) to design and implement a program for making the code mandatory

To support these efforts, a voluntary program to improve the energy efficiency of public schools, hospitals, and local government buildings will be developed The program will reduce energy costs in these buildings and can be used as a vehicle for educating both children and adults on the benefits and techniques of energy conservation This effort may initially be funded by USAID/G/ENV/EET as a pilot project The ECO Project will follow the pilot project with efforts to implement the program more broadly throughout India

Task 3 1 Government Procurement Policy
This task will focus on incorporating energy efficiency into government procurement policy, possibly by adopting minimum efficiency standards for such items as air conditioners, lighting, or the thermal performance of new government buildings The work will be coordinated with and make use of other ECO efforts and the work of other donors and government agencies to develop efficiency standards Potential areas of assistance include

- Developing and incorporating life cycle costing procedures for all government procurements
- Identifying high-volume, high-energy use appliances and equipment procured by the government for which minimum efficiency standards could be developed
- Developing and incorporating minimum efficiency standards into government procurement procedures and follow-up monitoring for compliance
- Developing a program to authorize government agencies to enter into energy performance contracts with ESCOs to reduce the energy costs of their facilities at no cost to the government and to share the savings with the ESCOs (i e , the U S model)

Associated Training
- *Course Procurement on the Basis of Life-Cycle Costs* This course will introduce GOI procurement officials to the use of life-cycle costing as a basis for procurement, minimum energy efficiency standards, and the importance of saving money through energy efficiency
- *Course Energy Efficiency Performance Contracting* This course will teach government officials and ESCO industry representative ways to design and implement financially-sound performance contracting programs for government agencies

Task 3 2 Schools, Hospitals and Local Government Buildings
This task will be based on a pilot program to be developed and funded by G/ENV/EET The program will fund energy audits of schools, hospitals and local government buildings, and will provide follow-on assistance to implement no/low-cost measures and to secure financing for medium- to high-cost measures through municipal financing, ESCOs or other arrangements Educational programs for students could be linked with the work this task performs in schools so that students have an opportunity to learn about energy efficiency

- Illustrative tasks in *schools* would include
    - Designing and implementing a national program based on the pilot program implemented by G/ENV/EET The national program could target no/low-cost elements such as painting schools white to make them cooler or more sophisticated approaches such as competitive bidding for energy performance contracting for entire school districts

  - Reviewing curricula at various grade levels regarding energy efficiency Based on this review, energy efficiency curriculum modules would be developed that are linked to the energy audit program These modules would teach students to save energy by planting trees, painting roofs white, or turning lights and fans off when a room is not in use Energy efficiency modules for more advanced students can focus on the role of energy in the Indian economy, issues of environmental protection and resource management, global climate change and careers in the energy sector, including energy efficiency-related careers

- Illustrative tasks in *hospitals and local government buildings* would include

  - Based on the G/ENV/EET pilot program, designing and a national energy efficiency program for the hospital industry and local governments to be implemented in conjunction with energy audit firms, engineering firms, and ESCOs This could include the development of standard performance contracts that hospitals or governments could use to streamline the process These entities could be encouraged to coordinate their energy efficiency programs, possibly grouping projects to make them more attractive financially to ESCOs and other financial institutions

  - Assisting hospitals and local governments in adopting energy efficiency procurement policies such as life cycle costing, minimum efficiency standards and similar techniques as hopefully will be adopted by the central government

Associated Training

- *Workshop Performance Contracting* This workshop will introduce hospital and local government officials to the basic concepts of performance contracting and give examples of how hospitals and local governments can use performance contracting to implement energy efficiency projects

- *Course Incorporating Energy Efficiency into Procurement Practices* This course will teach school, hospital and local government officials a variety of methods to incorporate energy efficiency goals into their procurement practices

Task 3 3 Building Energy Code

This task will focus on the development of a national building energy code The code would initially be voluntary and used primarily as an educational tool for architects, engineers, developers, and government officials involved with new building design and construction After building industry representatives become sufficiently informed about the energy code, an effort would be made to adapt and adopt it as a mandatory requirement at the state level Illustrative tasks include

- Reviewing the status of building codes in India and efforts in other developing countries to develop and implement building energy codes

- Based on the above review, developing a model building energy code for India that can be easily modified to accommodate the broad climatic variations throughout the country
- Using the building energy code as a starting point, conducting training for practicing architects and engineers on energy-efficient building designs
- Working with India's key schools of architecture to incorporate energy analysis and energy efficiency design principles into their curricula
- With the BEE and other government leaders, assisting the GOI in adopting the voluntary code as mandatory for all new government buildings and in monitoring compliance with the mandatory code
- Working with selected state governments to adapt and adopt the model building energy code as mandatory in their state States would also be assisted in training building code inspectors, builders, architects and engineers, and in monitoring compliance
- Working with a private estate developer/builder to implement the BEC on a voluntary basis and exploring mechanisms to incentivize developers/builders to construct more efficient buildings

Associated Training

- *Workshop Building Energy Code Compliance for Government Representatives* This workshop will train government officials on the building energy code, how to enforce it for government buildings, and the cost and benefits of a building energy code
- *Workshop Voluntary Building Energy Codes* This workshop will provide information on building energy codes, energy-efficient building designs, and building energy analysis for architects, engineers, developers, and building construction managers
- *Curriculum Development Energy Efficiency in Architecture* The project would help schools of architecture to develop energy efficiency curricula It would provide training, workshops, and study tours in the United States to expose faculty to market-driven and bankable energy efficiency features and methods It would also train professors of architecture where necessary, in preparing training modules, building energy analysis (computerized) and energy-efficient building design

3 1 4 Activity 4 Regulatory Reform and Restructuring

The purpose of this activity will be to continue USAID/New Delhi's technical assistance and training program in regulatory reform and restructuring The activity will provide for follow-up on tasks begun under the EMCAT project Specific tasks and associated training will be identified during the implementation of the ECO project in close coordination with the EMCAT project

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The strategy will be to 1) support the multilateral lending agencies' efforts to restructure state power sectors and to establish energy efficiency cells, potentially within the transmission companies, and 2) accomplish this in a coordinated fashion with the restructuring process This activity will also build the institutional capacity of energy efficiency cells to support all implementation aspects of energy efficiency projects The objectives and schedules of the multilateral lending agencies will be an important consideration in implementing the ECO Project's strategy for this activity

Task 4 1 Technical Assistance
Broadly, the ECO Project will assist and prepare India's state electricity boards (SEBs) for the institutional and functional changes that will occur as the state power sector restructuring (SPSR) projects are implemented Key changes will be the unbundling and corporatization of the sector as utilities are divided into separate generation and transmission companies and as the distribution function is privatized Most states have very limited experience in the areas covered by the reform measures, including regulatory issues, a single-buyer model, privatization transactions, financial restructuring, and corporate management The technical assistance will increase the SEBs' understanding of these issues by providing technical support, training, and assistance in document preparation in support of a wide range of restructuring issues

Associated Training
None

Task 4 2 Training
This task block refers to the training efforts presently conducted through the Administrative Staff College of India (ASCI) The illustrative courses, workshops and curriculum development below will support restructuring and reform efforts

- *Course Implementing Regulatory Systems* This course will provide examples and instruction on setting up regulatory policies, procedures, and formats for hearings, filings and decisions Mock hearings will also be conducted

- *Course Access to Regulatory Process for Industrial Customers* This course will examine the economic theory of regulation, effects of cross-subsidization, incentive and penalty regulation, energy efficiency and DSM measures that qualify for incentives and utility planning models

- *Course Business Development for SEB Engineers* SEB engineers will be encouraged to develop financial management and entrepreneurial skills that would help them set up new businesses (ESCOs, renewables promotion cell, cogeneration promotion cell, etc)

- *Course Access to the Regulatory Process for Commercial Customers* This course for commercial representatives will explain the economic theory of regulation, the effects of

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cross-subsidization, energy efficiency and DSM measures that qualify for incentives, and the use of trade associations for representation

- *Curriculum Development Access to the Regulatory Process for Residential Customers* An MBA-level academic course will be prepared on the utility's role in building the local economy, the regulatory process, financial and investment structure, and the concept of consumer advocacy in regulatory hearings

- *Study Tour Access to the Regulatory Process* In this study tour, graduates of the Regulatory Access course series would visit U S regulatory commissions, FERC, and utilities, environmental NGOs and consumer advocates

- *Course and Executive Seminar International Experience in Power Sector Regulation and Restructuring* Various restructuring models would be prepared and discussed with representatives of countries that have experience with these models (e g , USA, Argentina, U K)

- *Course Performance-Based Regulation for Utilities* This course will present international experience with performance regulation as an alternative to cost-plus regulation

- *Course Utility Asset Evaluation and Privatization* This course will review models for asset evaluation and discuss preparations that can improve the market value and competitiveness of bids

- *Course Integrated Resource Planning* Use IRP methods to improve decision making as it relates to energy efficiency programs, loss reduction, RFP preparation, power purchase contract negotiations, overall cost reduction, system reliability, transparency and support of filings to a regulatory commission

- *Study Tour Integrated Resource Planning* Eight graduates of IRP courses would be brought to the United States to visit utilities and regulatory commissions that have active IRP as part of their public planning process

3.2 COMPONENT 2: STATE-LEVEL ENERGY EFFICIENCY AND POWER SECTOR REFORM

This component is designed to assist a state reforming its power sector to incorporate energy efficiency policies and programs into the new legal and regulatory structure This component will be carried out in close cooperation with the World Bank, including the selection of the state targeted for technical assistance The four activities in this component will address the need for capacity building and financing, and focus on the weak link in the supply/demand chain the distribution system and agriculture sector

Activity	Description
1	Utility DSM/Energy Efficiency Capacity Building
2	State Energy Efficiency Financing Schemes
3	DSM/Energy Efficiency within Privatization of Distribution
4	Efficient End-Use Applications in Agriculture

3 2 1 Activity 1 Utility DSM/Energy Efficiency Capacity Building

The purpose of this activity will be to introduce DSM/energy efficiency (DSM/EE) principles and methods to a utility in a state undergoing power sector restructuring

The strategy will be to work closely with the SEB and multilateral banks involved in each state (e g , the World Bank) in the project definition and preparation stages This will allow the ECO team to interact with the Bank's task managers responsible for the reforms This linkage will be useful as the USAID effort can support the efficiency loan component preparatory work as well as develop a pipeline of projects that can utilize the planned lines of credit

Task 1 1 Identification of Target State for Technical Assistance
This task will develop a technical assistance implementation document that identifies at least one state in which to establish an energy efficiency cell The goal is to work with states that are committed to the restructuring process The design of the technical assistance will consider the objectives and abilities of key state institutions, the role of the private sector, and the involvement of any multilateral lending agencies in the restructuring process

This task will introduce energy efficiency practices to utilities through seminars or workshops that explain the need for energy efficiency and the types of energy efficiency programs This task will expose utility staff to energy efficiency program planning, design, implementation and evaluation issues Additional topics to be addressed include load research, efficient technologies, cost-effectiveness criteria, financing options, and the private sector's role in providing energy efficiency services Subsequent assistance can be provided in economic and financial analysis for energy efficiency, performance contracting, vendor financing, and program tracking and monitoring These goals will be achieved in part through study tours to North America and other Asian countries to observe utility energy efficiency and customer service programs

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Associated Training

- *Course The Role of Energy Efficiency in the Indian Energy Sector* This course will introduce energy efficiency concepts and will feature energy efficiency as an option in integrated resource planning It will demonstrate that wide-scale energy efficiency is indispensable in supporting economic growth in India and in improving the local and global environment

- *Study Tour Energy Efficiency Programs* Individuals with direct responsibility for implementing end-use efficiency policies in their companies will participate in this tour It will include a workshop with key representatives of the energy efficiency industry in the host country and field visits to utilities with successful energy efficiency programs

Task 1 2 Establishment and Institutional Support of DSM/EE Cell

This task will support the establishment and staffing of a DSM/EE cell in the state(s) identified in Tasks 1 A key issue will be determining where to locate the energy efficiency cell within the restructured utility organization The cell should ultimately serve the proposed transmission and distribution company (or companies) The distribution companies will implement the actual energy efficiency programs, but the overall planning and load research activities could be shared with the transmission company In Orissa, the energy efficiency cell was initially part of the transmission company, and will eventually be transferred to the distribution companies The transmission company will be entrusted with overall energy efficiency planning responsibilities

Other issues to be addressed by this task include staffing structure, skills mix, and the required computer hardware and software This task will also develop an energy efficiency regulatory mechanism that the utility will submit to the state regulatory body Specific actions to be undertaken include

- Designing an overall strategy for the energy efficiency cell, including the scope, length and type of energy efficiency programs

- Developing the capacity within the utility to plan, design, implement and evaluate energy efficiency programs and policies

- Helping the utility to establish links and promotional programs with key private sector agencies such as industry associations/chambers of commerce and other private sector energy efficiency service providers

- Helping the utility to evaluate and appraise the private sector's role in implementing its energy efficiency programs, designing and developing proposal guidelines, vendor lists, and lists of priority projects

- Determining the guidelines for innovative financing such as performance contracting and vendor financing

- Assist the utility to design and disseminate consumer awareness information in support of its energy efficiency programs

Associated Training

- *Workshop Energy Efficiency Cell Organization and Management* A workshop or series of workshops will introduce the energy efficiency cell staff to the organization and management functions that will sustain the energy efficiency cell The staff may also need training on the use of equipment and software

- *Course Cell Implementation* This course will seek to transfer to other SEBs the experiences and lessons learned from the establishment of the first one or two energy efficiency cells

Task 1 3 Load Research

Load research will be a key function of the energy efficiency cell The cell will need to systematically compile and analyze end-use load profiles of key end-users, which it can obtain through a sample process of metering customer classes Accurate load data will enable the cell to estimate different customer classes' contribution to system load, the duration and incidence of major end-users to the system's peak demand, and demand forecast Load research also will provide valuable information for DSM program design, impact analysis of tariff design on customer usage patterns, and related studies on rates and engineering design of distribution networks (e g , sub-station transformer capacities)

This task will support the energy efficiency cell's design and implementation of a load research program Illustrative areas of assistance include

- Training the energy efficiency cell staff in all aspects of load research

- Preparing a sampling plan for a load research program

- Procuring all the necessary hardware and software

- Conducting load research activities

- Preparing a strategic implementation plan for load control and management, and related energy conservation activities

Associated Training

- *Workshop Load Research* This workshop will train the energy efficiency cell staff on how to use equipment, software, and technologies to compile and analyze their load research data and to integrate the research into their DSM and IRP programs

Task 1 4 DSM/EE Pilot Programs

This task will support the energy efficiency cell's design and implementation of pilot programs The pilot programs will be developed in consultation with the utility, major end-users, and

industry associations Potential target sectors for the pilot programs are agriculture, industrial, commercial/residential, and municipal The pilot programs can be either educational or demonstration in nature

This task will focus on selecting financial institutions capable of designing and developing energy efficiency financing schemes Several financing mechanisms could be tapped for energy efficiency

- Direct loans by a utility to energy users, using the project appraisal and loan administration services of a national or state financial institution
- Direct investment by a utility in energy efficiency projects with a return to the utility
- Direct investment by the state government in energy efficiency projects
- Establishment of a State Energy Efficiency Financing (SEEF) scheme, capitalized by the multilateral banks' lines of credit at a national- or state-level financial institution
- Any of the above in combination with financing, e g foreign direct investment, from carbon emissions trading, the CDM or other flexible mechanisms

In the event that state-level organizations are considered, the SEEF scheme can be used to finance all types of energy efficiency projects, through mechanisms such as

- Direct loans to industries, municipalities, and commercial establishments
- Third-party financing for ESCOs undertaking performance contracting of agricultural, industrial, domestic and other energy efficiency projects
- Lines of credit for vendor financing

The SEEF scheme has several advantages It would

- Provide "one-stop" financing for any type of project
- Be operated by a well respected financial institution with experience in energy efficiency projects
- Serve only the state's energy users and energy efficiency services industry
- Provide the SEB and its successors with a ready source of World Bank financing for projects implemented under DSM without the requirement of loan management, etc

Associated Training

- *Course Energy Efficiency Technologies and Project Implementation* There will be a series of courses on energy efficiency technologies and the economics of energy efficiency within

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the Indian context Tailored courses can be developed for different target sectors One option will be to deliver the course at business management schools and then re-use the curriculum on a commercial basis and widen its delivery to affiliated schools

- *Workshop Energy Efficiency Finance Mechanisms* Working with state, SEB, and financial institution representatives, develop a set of financing mechanisms for energy efficiency projects The financing mechanisms will include possible financing coming as a result of carbon emissions trading or the CDM

3 2 2 Activity 2 State Energy Efficiency Financing Schemes

The purpose of this activity is to address the need to develop financial inter-mediation mechanisms to finance investments in energy efficiency and DSM This could be arranged through national and/or state financial institutions that could offer financing schemes for efficiency projects These state energy SEEF schemes could include plant and equipment, erection and commissioning, technical know-how fees for assessment, design and drawings Loans could be available for the following types of borrowers

- Energy efficiency projects in industry, commercial establishments and municipalities
- ESCOs carrying out single or aggregated projects under a performance contract
- ESCOs or equipment suppliers offering vendor financing

The strategy is to provide assistance under the SEEF program will be available for the installation of equipment and plant which

- is designed to improve energy efficiency or reduce peak electricity demand
- improve the ability for a plant to supply electric power to the grid
- inside-the-fence cogeneration

Task 2 1 Selection of Financial Institution
This task will require the development and design of a state-wide energy efficiency program financed through the SEEF scheme The ECO Project will work with appropriate financial institutions/banks in the state in the development of the SEEF scheme

Associated Training
None

Task 2 2 Project Assessment
This task area will require adapting typical procedures for the identification, pre-selection and assessment of projects that meet the needs of the selected financial institutions This assessment will include identifying specific pre-feasibility studies, financial conditions to be imposed on the borrower, and procedures for monitoring and verification

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Associated Training
None

Task 2 3 Design of Eligibility Criteria
This task area will support the development of eligibility criteria for the different types of projects proposed under the SEEF scheme Broadly eligibility criteria will be developed for

- single projects applying for loan financing
- lines of credit for ESCOs for vendor financing

Associated Training
Workshop State Energy Efficiency Financing The project will work with a group of state officials and bank project analysts to find formats and methods convenient and acceptable to both parties to accelerate the use of available borrowing capacity in energy efficient projects with large-volume applications

Task 2 4 Design of Financial and Operational Conditions
The ECO Project will assist in the development of the following conditions

- acceptable benchmarks with respect to debt/equity ratios, debt-service coverage and liquidity ratio
- appropriate tests of overall economic and financial feasibility
- promoters' contribution, period of repayment, security and approval procedures
- development of loan conditions (certification, procurement conditions, inspection provisions, insurance, information requirements and termination provisions)

Associated Training
None

3 2 3 Activity 3 DSM/Energy Efficiency within the Privatization of Distribution

The GOI is reviewing the findings and recommendations of the Coelho Committee on Private Sector Participation in Power Distribution The committee's report, among other things, has recommended the role of energy efficiency while developing its policy framework aimed at promoting private participation in the management and ownership of distribution licensees in the country A unique opportunity presents itself in designing a strategic framework for energy efficiency within the overall context of distribution privatization in India

The strategy is to assist in the design, development and implementation of organizational model structures (e g , joint ventures, management contracts, corporatization, distribution cooperatives, licensee operators) that permit efficient and vastly improved technical, financial and

management performance and operations, and to ensure distribution privatization, a key element of sector reforms As part of the power distribution sector reform, the strategy will include

- DSM/energy efficiency programs and plans as a key criterion in the selection of private distribution companies
- Investments in utility DSM projects/programs as part of the evaluation of assets and fixation of retail tariffs
- Regulatory and policy measures to address the issue of lost revenue, directing saved energy from low-paying to high-paying customers, introduction of peak and off-peak tariffs, etc

Task 3 1 Input to Debate on Privatization
The project will work with the Coelho Committee and/or its project advisers to evaluate the scope for introducing DSM policies and its planning in the Committee's report as well as in related follow-on work

Associated Training
None

Task 3 2 Efficiency Objectives and Tariff Design
The project will formulate a policy framework for promoting DSM in bulk and retail tariff design and the recovery of lost revenues due to customer energy savings In the context of energy shortages, it will also formulate a policy framework that permits the inter-sectoral transfer of saved energy (e g , from domestic and agricultural tariff classes to high-paying industrial tariff customers)

Associated Training
- *Workshop Energy Efficiency and Distribution Privatization* Workshops and seminars will be conducted to promote DSM as an important element of distribution privatization among private sector companies, end-users, utilities and state and central government ministries and agencies

Task 3 3 Inclusion of DSM Objectives in Bidding Process
DSM program objectives will be designed as part of the competitive bidding documents in the selection of private distribution companies Subtasks will include

- Working with potential acquirers of *distribution circles* and assets of Indian SEBs to ascertain the extent to which end-use efficiency objectives could be met through the privatization process

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- Working with SEB distribution departments to ascertain which "customer group or *distribution circles*" hold the greatest potential for end-use efficiency improvements and attempting to quantify costs, benefits and implementation aspects
- Promoting the development of a privately sponsored pilot project in distribution efficiency
- Assisting in project design, structuring and financing of this pilot
- Drafting efficiency-related bid evaluation and selection criteria

Associated Training

- *Workshop DSM and Efficiency in Privatization Bid Design* The project will provide U S examples and work with a group of distribution companies and ESCOs to develop workable DSM objectives and bidding formats

Task 3 4 The Reduction of Commercial (Non-technical) Losses

Utility commercial losses in India are significant These losses are all of the losses except the I^2R_t and kWh losses Included are uncollected bills, theft, lost or stolen materials, customers that are lost in the tracking system, and the application of inappropriate rates (commercial vs residential) As part of a wider loss reduction and end-use program, distribution systems and utilities must address these as early as possible Sub-tasks include

- Evaluating utility meter route management, and billing and payment systems including invoicing, self-assessment of meter efficacy, and potential for pre-payment metering
- Evaluating collection procedures, including how DSM program non-payment affects overall bills
- Evaluating meter department operations
- Reviewing engineering and design practices concerning accuracy and unauthorized use of energy
- Evaluating sub-metering services and their use in facility energy audits
- Implementing changes in the metering department

Associated Training

- *Workshop Commercial Loss Reduction* The workshop will provide case studies and other applications that will allow the utility to initiate a systematic program to reduce commercial losses

3 2 4 Activity 4 Efficient End-Use Applications in the Agriculture Sector

The purpose of this activity will be to support the design and development of illustrative activities to improve end-use efficiency in the agricultural sector In many states (e g , Haryana, Andhra Pradesh, Rajasthan, Karnataka, Tamil Nadu), the agricultural sector accounts for 30-50% of total energy consumption Outdated or poor quality equipment, inadequate (and in some cases free) electricity tariffs, substantial technical and commercial electricity losses, and poor service reliability are pervasive problems hindering the sector The ECO Project can make a significant contribution to overall energy efficiency by targeting programs to this sector

The strategy will be to encourage private firms to provide technical and other services to the agricultural sector to increase the end-use efficiency of various applications The tasks in this activity will emphasize reductions in peak demand and electricity consumption on priority feeders to alleviate chronic power shortages Technical measures to reduce electricity losses are well known, but their practice is not widespread Typical agricultural end-use efficiency programs that could be implemented as part of this activity include

- distribution feeder upgrades to reduce line losses[3]
- load management of distribution transformers[4]
- end-use efficiency of motor-pump sets[5]
- innovative irrigation methods to reduce water consumption

The private sector can play an important role in delivering these programs Energy savings would be measured either through an appropriately designed monitoring and verification system or by a stipulated savings method and sold to the utility under a performance contract

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[3] This could involve re-conductoring, installing efficient transformers and capacitor banks, and in some states (e g , Andhra Pradesh) examining the feasibility of high-voltage distribution systems, LT *less* distribution, single-phase transformers/motors and metering The energy savings could exceed 50-75% on account of reduction in IR losses, and prevention of theft from high-voltage lines (11kv instead of 440v sub-distribution)

[4] This would be done through the use of a remote communication system

[5] Replacement of pump sets and associated equipment such as foot valves, piping, etc could save electricity use by over 25-35% in typical cases

Task 4 1 Pilot Project Design and Implementation
A typical agricultural DSM[6] project will require the following actions

- Evaluating the water delivery system on all electrically-driven tube wells on designated feeders, including alternative irrigation methods to reduce water use
- Upgrading the water suction and distribution systems to meet BIS standards for piping and foot valves
- Replacing all non-submersible pump sets on the designated feeders with new mono-block centrifugal pump sets with high-efficiency motors to meet reduced water supply needs
- Arranging a multi-year leasing agreement with each farmer covering the pump sets and other hardware
- Arranging a multi-year maintenance contract with local motor re-winders and pump maintenance services, including training

Associated Training

- *Workshop Pilot Project Design* The project would familiarize all involved parties with the project objectives and in particular stress any additional benefits that might result from proper implementation Attendees would include farmers, distribution company, equipment vendors, rewinders and maintenance personnel, and rural ESCO staffs to ensure they understand the concepts and their roles

3.3 COMPONENT 3: ENERGY EFFICIENCY MARKET DEVELOPMENT AND FINANCING

Over the last few years, the Indian power sector has taken tangible steps towards liberalization and deregulation As India moves towards a market-based economy, issues such as competitiveness among its manufacturers, the rational pricing of inputs and outputs, and overall enterprise efficiency are becoming important Based on the growth of the private manufacturing industry and the rise of the financial services industry, the basic drivers for a market-driven energy services industry are emerging The following trends support a market transformation in the energy efficiency industry

- Industries and other large consumers face high energy prices

[6] To make the initial pilot simple and to test the "business model," it is suggested that emphasis be placed on pumpset rehabilitation and associated measures It is expected that feeder upgrades would be carried out by the SEB as part of the distribution system improvements under the SPSR program

- Multilateral lending agencies have large, focused loan and technical assistance projects to improve end-use efficiency
- Equity capital and debt financing for efficiency-driven process improvements are readily available
- Both Indian and international energy efficiency project sponsors have emerged
- Regulatory changes have stimulated greater market penetration of agro-fuel based cogeneration and renewable energy-based power technologies

This component of the ECO Project will assist the players and institutions that are usually involved in developing, designing, constructing and operating an energy efficiency project These include project sponsors or promoters, investors and lenders, equipment manufacturers, engineering companies (especially those providing turnkey services), and contractors

Activity	Description
1	Technical and Project Structuring Services for Sponsors
2	Financial Incentives and Credit Enhancement
3	Energy Efficiency Industry Support
4	Efficient Technology Promotion
5	Market Conditioning and Promotion
6	Non-Sugar Cogeneration

3 3 1 Activity 1 Technical and Project Structuring Services for Sponsors

The purpose of this activity will be to increase the number of projects that achieve financial closure and become operational Energy efficiency project proposals need to be structured so that financial institutions can appraise them with the least cost and time Many project sponsors, including ESCOs, end-users and equipment makers, identify projects but are unable to develop project proposals that meet the needs of lenders and other investors This occurs because many end-users and energy professionals have little or no exposure to the business and financial side of project development Many technically and commercially viable projects have been refused credit facilities because they lack a commercial strategy

The strategy is to work with project sponsors, end-users and equipment makers in selecting thermal and electric projects that are at a sufficiently advanced stage of technical viability It will provide technical and financial advisory services, and training to this group Project preparation

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assistance should be focused on realizing results in the form of committed projects and construction/installation activity

Task 1 1 Evaluation of Lender Criteria
The project will work with financial institutions such as the World Bank and ADB (including beneficiaries), IREDA, IDBI, ICICI and IL&FS as well as commercial lenders such as SBI (and including state-level financial institutions) and non-bank finance companies to ascertain their current requirements for appraising projects and committing funds This will include

- Developing a list comprising sources of funds and terms of all available and planned lines of credit, both multilateral development bank and local funds, organizations offering term loan facilities, equity portfolios, and infrastructure-directed funds available for investment in efficiency or modernization projects

- Obtaining from financial institutions, minimum lender requirements for each of these credit facilities

- Disseminating this information to project sponsors on a regular basis, establishing and maintaining a data base of the above information and posting it on a web site

Associated Training
- *Workshop ESCO/Financial Structure* A group of financial institution managers and ESCO managers will be assembled to determine viable loan mechanisms

- *Course ESCO Project Finance A* one-week course will introduce loan mechanisms to ESCOs and financial institutions

- *Course ESCO Performance Contracts* Successful and financing contracts with ESCO managers, industrial customers, and financial institutions will be reviewed

Task 1 2 Solicitation of Projects and Sponsors
One barrier to be overcome is the lack of a quality "pipeline" of projects The aim here is to establish a formal project cycle within the industry – from development to financing This will entail working closely with sponsors and others to develop projects that may be funded under the many lines of credit that are under development by the multilateral development banks It will be important to develop lender criteria for screening projects and sponsors in priority end-use sectors, ensuring a mix of thermal and electricity conservation and efficiency projects This includes

- Assisting sponsors on technical, financial, economic, and environmental issues

- Aiming towards pre-selecting at least 10 individual projects displaying a geographic mix and a range of technologies and sizes At least half these projects should be utility driven (SEB

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and private), with Indian (or joint venture) ESCOs, as opposed to strict equipment vendors, and at least one project must be in the rural (or agricultural sector)

- Giving priority to projects with concomitant benefits in improving the environmental emissions or characteristics of the facility or process, or conserving water supply and use

Associated Training

- *Course Project Screening* This course will help financial institutions to re-orient their project screening to include energy efficiency and modernization projects The program will be actively marketed to industry associations and other trade forums The training will include an overview of potential financing that may result from the Clean Development Mechanism and other flexible mechanisms

Task 1 3 Project Structuring Services

This task will offer project structuring support services to sponsors of energy efficiency projects It will include the development of easy-to-use financial models for analyzing electric and thermal efficiency projects, and

- Working with selected projects/plants/consultants to develop the terms of reference for feasibility studies, and devising cost-sharing principles for the terms of reference
- Carrying out feasibility studies, using industry experts to review and finalize documents, including procurement issues
- Preparing an easy-to-use (and modify) spreadsheet-based model that sponsors can use to analyze projects and make presentations to potential lenders and investors
- Development, or adoption of an already available, baseline methodology and model for possible use in determining a tradeable carbon offset
- Testing the viability of this model with development finance and other lenders, and evaluating all possible sources of funding and guarantees
- Wherever appropriate, investigating the applicability of the proposed USAID DCA facility
- Provide assistance on project document preparation and risk management
- Assisting in arranging external financing as necessary and appropriate
- Participating in the final decision and selection of projects eligible for financing
- Providing supervision and monitoring as required by USAID, multilateral development banks, sponsors or lenders

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This task should result in a minimum of eight completed feasibility studies including financing quality documents, and signed project agreements for at least four projects The above tasks should be closely coordinated with Activity 2 of this Component

Associated Training

- *Workshop Financial Model* ESCOs and financial analysts will be brought together in one workshop to work out concurrent approaches to financial modeling The financial model and tools developed as part of the technical assistance program will be used in the training session ESCOs and lenders will benefit as they require well-analyzed projects in order to accelerate and simplify loan applications

Task 1 4 Dissemination of Financial Models and Tools

The project will evaluate different Indian organizations that will work with ECO in co-developing this business and financial advisory expertise with the ultimate objective of being able to provide project structuring support service on a continuous basis This includes

- Evaluating private financial advisory firms, non-banking finance companies, and development banks

- Transferring the financial appraisal know-how developed under this activity to industry participants

Associated Training

None

3 3 2 Activity 2 Development of Financial Incentives and Credit Enhancement

The purpose of this activity is to catalyze the development, negotiation, financing and construction of medium to large-scale energy efficiency projects and the marketing of energy - efficient consumer products through established distribution channels Soft loans, conditional grants, interest rate buy-downs, and loan guarantees reduce the perceived and actual risk associated with energy efficiency projects

The strategy is to spur investment in projects that show a significant GHG reduction potential, including non-sugar cogeneration projects in refineries, cement, sulfuric acid plants, pulp and paper, petroleum coke application in power generation and large-scale lighting projects Groups such as private/public non-bank finance companies, IDBI, ICICI, and IL&FS, as well as reform utilities who are administering lines of credit, have stated that lowering their (and other investors') perception of risks in particular energy efficiency projects would be beneficial from a number of perspectives (costs of loans, loan tenors and the speed at which disbursements can be made)

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Task 2 1 Grant Element Design
The project will develop a grants program for business demonstrations, including

- Designing and sizing the proposed USAID conditional grants program to meet the needs of Indian sponsors and lending institutions, keeping in mind the demonstration and replicability impacts of such grants
- Identifying and selecting Indian financial institutions, both public and private, as hosts of this grant facility
- Co-analyzing with the designated financial institution, the profile of typical borrowers, assessing market demand and developing a term sheet lending institutions can use
- Preparing a grant facility marketing plan
- Preparing grant facility operational and management guidelines
- Identifying desired terms of an accompanying guarantee facility
- Coordinating with the proposed USAID DCA Program described below
- Review and monitor projects on an on-going basis

Associated Training
- *Course Energy Efficiency Conditional Grant Program* This program will train the staffs of selected Indian financial institutions on the scope and mechanics of the conditional grant program and encourage them to use this grant program in an accretive manner

Task 2 2 Guarantee Program Design
USAID is in the process of developing a credit authority (similar to USAID's housing finance guarantee authority) that can be used in such applications as include energy efficiency projects This task will review the market for a guarantee instrument and assess the conditions under which the USAID/New Delhi mission would make it operational This will include

- Appraising the applicability of the proposed USAID Development Credit Authority to Indian financial market conditions
- Identifying Indian financial institutions, both public and private, as hosts of this DCA facility
- Preparing a profile of typical borrowers, assessing market demand, and developing a term sheet for use by lending institutions
- Collecting preliminary application materials to submit to the DCA for informal review

- Identifying the desired terms of a guarantee facility
- Coordinate with the Specific Project Grant Program described above

Associated Training

- *Course Development of USAID's Credit Authority Program* The staffs of selected Indian public and private financial institutions will be trained on the scope and mechanics of the conditional grant program

3 3 3 Activity 3 Energy Efficiency Services Industry Support

The purpose of this activity is to build a commercially viable, thriving and modern energy efficiency industry that can provide market-based solutions to address the needs of the proposed legislation ordering the implementation of energy efficiency The energy services industry must take advantage of the gradually liberalizing economy and organize itself to offer attractive business solutions to industry

The goal here is to encourage and support market forces that will motivate credible industry players (both Indian and foreign) to enter into or expand their presence in this market The Indian energy efficiency industry is made up of energy auditors, architect/engineers, contractors, equipment vendors, ESCOs, and distribution utilities

The strategy is to use market forces, including financing mechanisms that may emerge as a result of the Kyoto Protocol, to complement the effectiveness of proposed mandatory actions in achieving energy efficiency objectives An approach would be to work with industry trade and professional organizations to advance the concept of voluntary accreditation of energy auditors and engineers This would enable ESCOs and other entities to interact with their U S counterparts and obtain first-hand access to process "know-how" and methods

Task 3 1 Voluntary Audit Certification Program

This task would propose a rationale for a voluntary auditor certification program as opposed to a nationally mandated program through a government agency An example might be the Indian Institute for Chartered Accountants, which is administered as a professional accreditation and certification body USAID has worked with professional associations (e g , Association of Energy Engineers), and found that voluntary certification bodies have a substantial impact on the quality and quantity of independent audit firms, engineering firms and end-users This task will include

- Screening internationally accepted professional associations that offer a model for the Indian market
- Developing the charter, compliance requirements and outreach needed to create a viable certification program, with emphasis on the linkage to the proposed BEE legislation

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- Sponsoring the newly formed energy auditing certification association to provide energy auditor instruction course (a 2-week course)
- Arranging to host at regular intervals, across the country, energy manager certification tests that will result in a cadre of certified energy managers
- Develop and maintain a network of these certified energy managers

Associated Training

- *Workshop Energy Auditor Instruction* The Indian Association of Energy Engineers (when formed) will be assisted in building a curriculum and delivering a course to prepare auditors to pass a certification test

Task 3 2 Formation of Trade Association

This task will provide the leadership and support for the creation of an Indian Energy Service Companies Association, either as an independent group or as part of an existing organization (e g , CII) This will include

- Coordinating input from other ESCO organizations such as the National Association of Energy Services Companies (U S) and Brazil Association of Energy Services Companies
- Develop the charter, membership guidelines and products that such an organization can provide its members
- Preparing a business plan and first-year agenda together with the selected organization
- At a minimum, developing a model performance contract (along with explanations) suitable for application in India and distributing it to members This could also serve as a teaching tool for trainers
- Monitoring the progress made by this organization

Associated Training

- *Workshop Indian Energy Service Company Association* Representatives of interested ESCOs and similar associations from other countries will be given assistance in chartering a not-for-profit association

Task 3 3 Developing a Business Exchange

This task will introduce an ESCO/engineering services/end-user exchange program to help foster the development of a cadre of business managers who have actual experience in executing projects While many Indian companies are knowledgeable on the guidelines and process of putting together a project on a performance basis, few have working experience with these arrangements

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An exchange program will give Indian professionals access to actual "know-how" on all aspects of the project cycle The preferred approach is to have Indian professional firms spend time (4-6 weeks) with their U S counterparts on projects and learn through a hands-on approach The motivation for the U S companies is the opportunity to work closely with Indian parties and develop business relationships Where ESCOs would be involved, the approach would be to work through the new Indian ESCO association This task will include

- Developing guidelines on local and foreign firm selection criteria, and cost-sharing on a competitive basis
- Promoting the program to prospective participants both Indian and foreign firms who can send experts to work with Indian companies for a 2-4 week period
- Monitoring, coordinating and providing support to both sets of players in each country
- Maintaining contact with staff and assisting in project preparation through other ECO activities

Associated Training

- *Study Tour Indian ESCO and End-user Efficiency Management* Several Indian ESCO managers and large industrial energy managers will visit with their U S counterparts Follow up assistance will be provided to ensure they are given speaking engagements to disseminate their experience

Task 3 4 Verification Protocols

This task will encourage the adoption of a measurement and verification protocol as a means of independently verifying energy savings and benefits The task will be done in cooperation with the new Indian ESCO association The adoption of standardized project measurement and verification (M&V) protocols should result in more reliable savings estimates and is a stepping stone toward the baselining and certification of GHG emissions reductions that will be required under the CDM These protocols can also reduce transaction costs, especially in the Indian market where commercial dispute resolution is time consuming Multilateral development banks and commercial lenders require M&V as part of their minimum lender requirements This task will include

- Coordinating with USDOE's International Performance Measurement and Verification Protocol (IPMVP) effort
- Screening and identifying an organization that can assist in the development and adaptation of M&V protocols already developed
- Adapting the IPMVP effort to Indian market conditions, starting with priority technologies and processes

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Associated Training

- *Course Measurement and Verification Protocol* This course will instruct ESCOs, end-users and lenders on techniques, tools and benefits of measurement and verification protocols to project financing and contract development

- *Workshop Measurement and Verification Protocol* This workshop will adapt international examples of M&V protocols to formats applicable to Indian industry It will also include an introduction to the establishment of baselines at the plant level and the certification of GHG emissions reductions

3 3 4 Activity 4 Efficient Technology Promotion

The purpose of this activity is to identify critical market constraints to key energy efficiency technologies and to develop tasks aimed at removing these constraints

The strategy is to focus on removing critical market barriers to key energy efficiency technologies The approach will be to first identify key technologies, such as electric motors, where efficiency improvements could have a significant effect on energy consumption and GHG reduction, and then to analyze the entire market chain from manufacturing to distribution to final sale Constraints to expanded market penetration will be identified within the market chain and then tasks will be developed to address the specific constraint Examples of tasks include developing a "golden carrot" program to improve the level of energy efficiency of equipment at the point of manufacture or credit enhancement of consumer financing at the point of sale to bias consumer choice toward the purchase of more efficient appliances Given the technology focus of this activity, an attempt will be made to develop it in cooperation with the Technology Cooperation Agreement Pilot Program (TCAPP) being spearheaded by NREL with funding from USAID Illustrative tasks under this activity include

Task 4 1 Market Choke Point Analysis and Alleviation

This task will identify critical market constraints to key energy efficiency technologies and then develop tasks to help alleviate the constraints Subtasks include

- Conducting a screening exercise to determine which technologies have the greatest potential for reducing energy consumption and GHG emissions in India Possible critical technologies include motors, lighting, air conditioning, pump sets, steam and condensate equipment, combustion equipment and packaged cogeneration MARKAL MACRO[7] or a similar GHG/energy model will be used to determine the technologies with greatest GHG reduction potential

[7] MARKAL MACRO is a commonly used computer model that can determine the GHG impact of energy policy changes at the national level

- Selecting a critical technology and analyzing the entire market chain for barriers to further market penetration based on the screening exercise, identifying choke points in the marketing chain, and developing policy and program options for alleviating the choke points
- Working with government and industry to select the best options and implementing an efficient technology promotion program to address these market barriers

For example, a program aimed at improving the market penetration of three or four of these technology-based programs can be undertaken As an example, the case of high-efficiency electric motors is explored in the next task

Associated Training

- None

Task 4 2 Efficient Technology Promotion (e g , A Motor Efficiency Program)

Electric motors are the largest single electricity consuming end-use device in India, consuming approximately half of all electricity Within the industrial sector the percentage is even higher, with motors accounting for about 70% of electricity consumption Thus, even without the screening exercise in Task 4 1, motors can be identified as a critical technology for which a program designed to improve efficiency is required Illustrative tasks for such a program include

- Surveying motor manufacturers and vendors to determine the current sales patterns of motors by size, efficiency, customer and other relevant parameters
- Reviewing motor efficiency programs in other developing countries, such as Mexico, for lessons learned applicable to India
- Soliciting the involvement of motor manufacturers and vendors in an informational campaign to encourage the purchase of high-efficiency motors
- Working with training providers to the industrial, commercial and agricultural sectors to design courses on the technology and economics of efficient motor procurement and use
- Working with major manufacturers to increase the availability and range of efficient motors in the Indian market
- Working with financial institutions and manufacturers to develop incentives for the procurement of high-efficiency motors
- Using the technology promotion program to market a "systems" approach based on the technology selected Technology systems include operations, controls, maintenance and related equipment – these broader system efficiency improvements often provide opportunities far more profitable than the technology itself, e g , for motors, efficiency improvements can save 2-5%, but better control and operations can save up to 15%

- Supporting and promoting the adoption of motor efficiency labeling and standards
- Developing a program to address the degradation in efficiency that occurs during the motor repair and refurbishing process
- Developing an Indian technology promotion program, e g , a "Green Lights" program or a "Motor Challenge Program" for India, including setting up
    - A clearinghouse, e g , for motors it will include the manufacturers, models, specifications including efficiency, size, and other important parameters relating to motor selection
    - Case studies, e g , for motors it will include examples where they have been used more efficiently and programs that promote the use of high-efficiency motors
    - Analytical tools, including software program such as "Motor Master Plus," where plant managers can quickly calculate payback periods for various technology options using plant-specific parameters
- Providing hands-on demonstrations to industry managers and operators on the economic and financial benefits of high-efficiency motors and their operation as well as quality rewinding techniques
- Providing hands-on demonstrations to those engaged in the refurbishment and rewind of motors This would include the design of procedures, sample tool kits and materials of reconstruction, and would encompass the fractional horsepower industry as well as large-scale rewinders

Associated Training

- *Workshop Efficient Technology Promotion* Industry managers, operators and those engaged in engaged in the refurbishment and rewind of motors would be given hands-on training on the economic and financial benefits of high-efficiency technologies (e g , motors) and their operation as well as quality rewinding techniques It would include the design of procedures, sample tool kits and materials of reconstruction, and encompass the fractional horsepower industry as well as large-scale rewinders
- *Course Efficient Technology and Systems* For the technologies selected, a customized training course would be given to plant managers and owners on efficient technology and systems where all aspects of operation, application and specification are covered
- *Course Equipment Maintenance and Repair* For the technologies selected, a customized training course for plant managers and owners would be given on unit operation and specific energy consuming equipment maintenance and repair, e g , steam trap repair, burner system maintenance and motor rewind

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3 3 5 Activity 5 Market Conditioning and Promotion

The purpose of this activity is to build an energy efficiency industry that can provide a steady stream of high-quality, competitive, energy-efficient, environmentally friendly, and easily accessible products at the retail and custom market levels Indian markets lack available competitive, reliable and proven energy-efficient technologies at the process and product levels In order to overcome this critical barrier, ECO will encourage the market entry of Indian and joint venture companies involved in energy/environmentally efficient product manufacturing, services and retailing

The strategy is to eliminate market barriers that have held back investment in energy-efficient product manufacturing and services Simultaneously, this activity aims to take advantage of positive market forces such as the explosive growth in consumer finance and innovative distribution channels such as direct marketing

Task 5 1 Efficient Branded Equipment Promotion
This task's goal is to increase the market opportunities for the branded manufacturing of energy efficiency products in India It will include

- Compiling data and survey information, and assessing the market potential for branded, energy-efficient products (e g , compact fluorescent lamps, transformers, compressors motors) across the commercial, residential and industrial markets

- Compiling data and survey information, and assessing the market potential for control systems and information technology solutions, e g , process automation, supervisory, control and distribution automation systems (SCADA), and advanced energy audits across the commercial and industrial markets

- Conducting a market study among U S and Indian manufacturers of energy-efficient equipment and processes, and assessing their readiness to enter the Indian market, and examining barriers to their entry including providing them with information on the Indian market and players

- Coordinating with Activity 1 tasks and find synergies between project feasibility studies, sponsors and end-users

Associated Training
None

Task 5 2 Market Expansion
The project team will engage in dialogue with energy-efficient product manufacturers, non-bank finance companies, and other relevant entities to increase the distribution of efficient products through established and new distribution channels This task will include

- Examining the potential for distributing energy-efficient equipment through innovative marketing channels, and at a minimum, examining the following marketing routes
  - direct marketing programs
  - vendor leasing programs
  - bill discounting
  - combination leasing with higher value equipment, e g , air conditioners
  - direct sales
  - "green" marketing
  - government tender route through DGSND
  - trading companies
- Coordinating with the policy effort and working with ISI and BIS to include a labeling and efficiency program for equipment that is likely to be marketed through the innovative marketing channels described above

Associated Training

- *Workshop Innovative Marketing of Energy Efficiency Products* ESCOs, vendors, advertisers, and manufactures will be brought together in a cooperative effort to increase customer awareness and build stronger, more discerning markets
- *Course Marketing Energy Efficiency Products* This course will present the experience of product marketers, including direct marketing, vendor leasing programs, bill discounting, combination leasing with higher-value equipment, direct sales, government tender route through DGSND, trading companies, green marketing, customer awareness, product differentiation, labeling programs, standards, and advertising

3 3 6 Activity 6 Non-Sugar Cogeneration Activities

The purpose of this activity is to test and validate the concept of selling excess cogenerated power to utilities using commercial principles in the pricing and negotiation of power sales Sugar or biomass cogeneration was a logical entry point to do so Work by USAID in this area has significantly advanced biomass cogeneration projects in a few states and has also helped promote national policies The scope and potential for industrial cogeneration in non-sugar applications (e g , refineries, fertilizers, pulp and paper, textiles, engineering, chemical processes) remains virtually untapped but is large [8] The desire for reliable and quality power has forced industry to install captive power equipment to provide power supply security In many

[8] Various estimates place the technical potential for industrial cogeneration in India to be around 15,000 MW as against 3,500 MW for sugar cogeneration

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cases industrial cogeneration could be a more cost-effective choice in view of its energy-efficient design and the possibility of effecting power sales to the grid

The strategy will involve the commercial development of cogeneration projects in existing industrial facilities or those either at the inception, expansion, or rehabilitation stages At first, "within-the-fence" cogeneration projects would be promoted and in selected cases the sale of excess power or its wheeling/banking and sale to third parties would be considered

Emphasis should be placed on effecting significant energy efficiency gains by optimizing the design of the cogeneration system to meet process thermal energy needs and generate byproduct power at a site Technical configurations would span a range of cogeneration systems from the conventional boiler-steam turbine systems to gas turbine topping cycles to process waste-heat recovery bottoming cycle systems Also to be examined for its application in selected industrial regions in India (e g , Thana-Belapur, Baroda, Faridabad) will be the feasibility of a single combined heat-power facility that would serve the thermal and electric power demands of a conglomeration of industrial plants

Task 6 1 Entry Strategy
Since ECO will have to prioritize the sectors and technologies in which it will work, the first step is

- Conducting a national survey of industrial plants to establish the technical and economic potential for cogeneration, and using this survey to develop a program plan for the activity

Associated Training
None

Task 6 2 Development of Technical and Commercial Criteria
The experience of the sugar industry is useful here The early proof-of-concept and development of technical assistance to sugar mills and equipment suppliers was crucial in getting projects off the ground The sub-tasks here include

- Establishing standard or model system configurations based on industry type, range of heat-power ratios, etc
- Establishing technical and other criteria for the selection of pilot cogeneration systems
- Examining the feasibility of merchant and utility power sales, developing a methodology for pricing cogenerated power in industrial facilities, and developing contractual agreements for sale or wheeling/banking to third parties

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Task 6 3 Pilot Projects Selection and Support
This task will work with project sponsors to select pilot projects in non-sugar cogeneration This will involve

- Conducting at least five pre-feasibility studies
- Conducting at least two detailed feasibility studies
- Assisting in the development of the project financing plan, including testing the applicability of the capital grant and development credit authority
- Facilitating the design, development and engineering of a pilot cogeneration plant

Associated Training
- *Workshop Cogeneration Systems* A series of workshops will be held on 1) cogeneration schemes, design issues, fuel choices and other system issues, 2) project financing, 3) interconnection and utility markets The workshop will also be used to disseminate project findings, especially technical and fuel management studies The audience will include policy makers from the state and central levels, as well as end-users and sponsors, equipment players, groups of SEB staffs, industrial cogeneration hosts, developers, lenders, and investors

CHAPTER 4
BUDGET ESTIMATES

Exhibits 1, 2 and 3 present detailed budget estimates for each component Exhibits 4 and 5a-c present the main cost assumptions used in the analysis and the buildup for the estimated cost of the proposed long term advisor and field office in each component [1] Each of the summaries present estimated costs down to the task level, plus estimates for a long term advisor and field office costs in each component and the $5 million of grant funds in Component 3 Although the spreadsheet has been structured to allocate activity-level costs by year, an estimate of the annual distribution of costs has not yet been included in this analysis

The summary budgets follow the basic structure presented in the Armstrong/Dalal/Gembol memo of April 3 The budgets show the following information

Technical Assistance

Level of Effort Professional level of effort (LOE) is presented in person-months of expatriate and local (CCN) labor The specific LOE amounts are based on a percentage allocation of total LOE requirements between each activity and then between the tasks within each activity **(Activity Allocations, Activity Allocations C2)** These estimates do not include specialist expatriate labor associated with specific training activities (see Training section below)

Costs (technical assistance LOE) The estimated cost of expatriate and local technical assistance labor is based on average senior and mid-level labor rates for the functional labor categories likely to be required for implementing this activity Exhibit 4 shows the main labor, direct expenses, and training cost assumptions **(assump)**

Travel This category covers estimated travel-related expenses for the short term expatriate and local labor The cost estimates through a series of assumptions based on the level of effort estimates Exhibit 4 **(assump)** shows the assumptions and estimates The assumptions include the amount of expatriate and local LOE spent in the field, the average days per international trip, average airfare costs, per diem levels and costs, and local travel costs

Commod (equipment/commodities) The estimates are based on task-specific requirements rather than overall assumptions **(Activity Allocations, Activity Allocations C2)**

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[1] Full details of the cost estimates are included in an accompanying Excel file In the text, the boldface terms enclosed in parentheses - **(assump)** for example – refer to specific named worksheets in the spread sheet file

Other Other direct costs (communications, supplies, copying, etc) are estimated based on an assumption of costs per LOE month **(assump)**

Training

The separate training cost estimates are based on assumptions regarding the unit cost of four types of training activities curriculum development course (course), one-week workshop, 1-2 day workshop, and new project-specific courses (new course) The estimated costs of each type of training includes two elements 1) the average unit cost of local labor and direct expenses, and 2) specialist expatriate labor requirements associated with each type of training **(assump)** The number of each type of training was then estimated on a task-specific **basis (Activity Allocations, Activity Allocations C2)** and the resulting LOE, LOE costs, and direct expenses are shown in the summary exhibits

It should be noted that Task 2 of Activity 4 includes only an estimated training amount totaling about $2 6 million This a summary estimate of the overall training cost for regulatory reform and restructuring that cannot be otherwise allocated to specific tasks or activities at the initial stage of the project design

Long Term Advisor and Field Office Costs

The current project design includes a five-year expatriate long-term advisor for Component 1 and for overall ECO Project management and coordination, a three-year expatriate long-term advisor for Component 3 followed by a two-year local resident advisor, and a five-year local resident advisor for Component 2 The total estimated costs are shown in the summary exhibits and estimated unit costs and annual costs are presented in Exhibits 5a, 5b and 5c **(C-1 Long Term, C-2 Long Term, C-3 Long Term)** Although the long term advisors will actively participate in many component activities, the costs of their labor, allowances, and related field office expenses are shown separately in this budget presentation

Exhibit 1 Component 1 Summary	Technical Assistance							Training			
	Level of Effort (p/m)		Cost					Expat	Expat		
	Expat	Local	Expat	Local	Travel	Commod	Other	LOE	Cost	Expenses	TOTAL
Activity 1 Energy Efficiency Policy and Institutional Support											
Task 1 Support to the Bureau for Energy Efficiency	10 20	14 70	191 862	36 544	106 290	150 000	25 520	0 50	9 405	40 000	559 621
Task 2 Energy Efficiency Policy Development	8 93	10 50	167 879	26 103	93 004	0	22 330	0 25	4 703	20 000	334 019
Task 3 Institutional Transformation	6 38	16 80	119 914	41 765	66 431	50 000	15 950	2 75	51 728	190 000	535 787
	25 50	42 00	479 655	104 412	265 725	200 000	63 800	3 50	65 835	250 000	1 429 427
Activity 2 Energy Efficiency in Consumer Appliances											
Task 1 Appliance Labeling	5 10	4 50	95 931	11 187	53 616	0	13 200	1 50	28 215	100 000	302 149
Task 2 Minimum Energy Efficiency Appliance Stand	3 83	6 30	71 948	15 662	40 212	0	9 900	0 25	4 703	20 000	162 425
Task 3 Appliance Energy Efficiency Testing	3 83	7 20	71 948	17 899	40 212	100 000	9 900	0 50	9 405	40 000	289 364
	12 75	18 00	239 828	44 748	134 040	100 000	33 000	2 25	42 323	160 000	753 938
Activity 3 Energy Efficiency in Government Facilities and Private Buildings											
Task 1 Government Procurement Policy	3 19	4 50	59 957	11 187	39 705	0	9 763	1 00	18 810	50 000	189 421
Task 2 Schools Hospitals and Local Government B	3 19	9 00	59 957	22 374	39 705	0	9 763	1 75	32 918	110 000	274 716
Task 3 Building Energy Code	6 38	4 50	119 914	11 187	79 410	0	19 525	2 25	42 323	120 000	392 358
	12 75	18 00	239 828	44 748	158 820	0	39 050	5 00	94 050	280 000	856 496
Activity 4 Regulatory Reform and Restructuring including Training											
Task 1 Technical Assistance	8 50	12 00	159 885	29 832	272 035	0	70 400	1 25	23 513	70 000	625 665
Task 2 Training	0 00	0 00	0	0	0	0	0	**22 25**	418 523	1 330 000	1 748 523
Task 3	0 00	0 00	0	0	0	0	0	0 00	0	0	0
	8 50	12 00	159 885	29 832	272 035	0	70 400	23 50	442 035	1 400 000	2 374 187
Long Term Advisor	60 00										1 546 900
Field Office Costs											433 000
Training Activities Management											750 000
TOTAL	119 50	90 00	1 119 195	223 740	830 620	300 000	206 250	34 25	644 243	2 090 000	8 143 948
									3 484 243		2 498 523

Exhibit 2 Component 2 Summary

	Technical Assistance							Training			
	Level of Effort (p/m)		Cost					Expat	Expat		
	Expat	Local	Expat	Local	Travel	Commod	Other	LOE	Cost	Expenses	TOTAL
Activity 5 Utility DSM/Energy Efficiency Capacity Building											
Task 1 Identification of Target State for Technical A	1 28	1 80	23 983	4 475	21 817	0	5 445	3 00	56 430	190 000	302 149
Task 2 Establishment and Institutional Support of D	3 83	2 40	71 948	5 966	65 450	50 000	16 335	2 25	42 323	140 000	392 022
Task 3 Load Research	2 13	6 00	39 971	14 916	36 361	250 000	9 075	0 75	14 108	40 000	404 431
Task 4 Conduct DSM/EE Pilot Programs	1 28	1 80	23 983	4 475	21 817	0	5 445	2 00	37 620	140 000	233 339
	8 50	12 00	159 885	29 832	145 445	300 000	36 300	8 00	150 480	510 000	1 331 942
Activity 6 State Energy Efficiency Financing Schemes											
Task 1 Selection of Financial Institution	2 13	1 50	39 971	3 729	19 288	0	4 813	0 00	0	0	67 800
Task 2 Project Assessment	2 13	1 50	39 971	3 729	19 288	0	4 813	0 00	0	0	67,800
Task 3 Design of Eligibility Criteria	2 13	1 50	39 971	3 729	19 288	0	4 813	0 25	4 703	20 000	92 503
Task 4 Design of Financial and Operational Conditi	2 13	1 50	39 971	3 729	19 288	0	4,813	0 00	0	0	67 800
	8 50	6 00	159 885	14 916	77 150	0	19 250	0 25	4 703	20,000	295 904
Activity 7 DSM/Energy Efficiency within Privatization of Distribution											
Task 1 Input to Debate on Privatization	0 85	1 20	15 989	2 983	8 423	0	2 090	0 00	0	0	29 484
Task 2 Efficiency Objectives and Tariff Design	1 70	3 00	31 977	7 458	16 845	0	4 180	0 75	14 108	40 000	114 568
Task 3 Inclusion of DSM Objectives in Bidding Pro	2 13	3 00	39 971	7 458	21 056	0	5 225	0 25	4 703	20 000	98,413
Task 4 The Reduction of Commercial (Non-technic	3 83	4 80	71 948	11 933	37 901	0	9 405	0 00	0	0	131 187
	8 50	12 00	159 885	29 832	84 225	0	20 900	1 00	18 810	60 000	373 652
Long-Term Advisor	60 00	24 00									974 210
Field Office Costs											391 000
TOTAL	85 50	54 00	479 655	74 580	306 820	300 000	76 450	9 25	173 993	590 000	3 366 708
Activity 8 Efficient End-Use Applications in the Agriculture Sector (funds from ANE)											
Task 1 Pilot Project Design and Implementation	20 00	35 00	376 200	87 010	207 060	100 000	49 500	2 50	47 025	140 000	1 006 795

Exhibit 3 Component 3 Summary

	Level of Effort (p/m)		Technical Assistance Cost					Training			
	Expat	Local	Expat	Local	Travel	Commod	Other	Expat LOE	Expat Cost	Expenses	TOTAL
Activity 1 Technical and Project Structuring Services for Sponsors											
Task 1 Evaluation of Lender Criteria	4 62	4 18	86 902	10 391	44 226	0	10 742	1 00	18 810	70 000	241 071
Task 2 Solicitation of Projects and Sponsors	9 24	16 72	173 804	41 566	88 452	0	21 483	0 50	9 405	40 000	374 710
Task 3 Project Structuring Services	10 78	6 27	202 772	15 587	103 194	0	25 064	0 25	4 703	20 000	371 319
Task 4 Dissemination of Financial Models and Tool	6 16	14 63	115 870	36 370	129 730	0	31 508	0 00	0	0	313 478
	30 80	41 80	579 348	103 915	365 602	0	88 796	1 75	32 918	130 000	1 300 578
Activity 2 Development of Financial Incentives and Credit Enhancement											
Task 1 Grant Element Design	11 20	7 60	210 672	18 894	106 325	0	25 740	1 00	18 810	50 000	430 441
Task 2 Guarantee Program Design	11 20	7 60	210 672	18 894	106 325	0	25 740	0 00	0	0	361 631
	22 40	15 20	421 344	37 787	212 650	0	51 480	1 00	18 810	50 000	792 071
Activity 3 Energy Efficiency Industry Support											
Task 1 Voluntary Audit Certification Program	6 72	9 12	126 403	22 672	107 546	0	26 294	0 50	9 405	40 000	332 321
Task 2 Formation of Trade Association	6 72	9 12	126 403	22 672	107 546	0	26 294	0 25	4 703	20 000	307 619
Task 3 Development of Business Exchange	5 60	7 60	105 336	18 894	89 622	0	21 912	1 00	18 810	50 000	304 574
Task 4 Verification Protocols	3 36	4 56	63 202	11 336	53 773	0	13 147	0 75	14 108	60 000	215 566
	22 40	30 40	421 344	75 574	358 488	0	87 648	2 50	47 025	170 000	1 160 079
Activity 4 Efficient Technology Promotion											
Task 1 Market Choke Point Analysis and Alleviation	6 72	6 08	126 403	15 115	62 363	0	15 279	0 00	0	0	219 160
Task 2 Efficient Technology Promotion	15 68	24 32	294 941	60 460	145 513	50 000	35 651	0 75	14 108	60 000	660 671
	22 40	30 40	421 344	75 574	207 875	50 000	50 930	0 75	14 108	60 000	879 831
Activity 5 Market Conditioning and Promotion											
Task 1 Efficient Branded Equipment Promotion	9 80	13 30	184 338	33 064	98 413	0	23 870	0 00	0	0	339 685
Task 2 Market Expansion	4 20	5 70	79 002	14 170	42 177	0	10 230	1 50	28 215	70 000	243 794
	14 00	19 00	263 340	47 234	140 590	0	34 100	1 50	28 215	70 000	583 479
Activity 6 Non-Sugar Cogeneration Activities											
Task 1 Entry Strategy	2 80	3 80	52 668	9 447	26 653	0	6 490	0 00	0	0	95 258
Task 2 Development of Technical and Commercial	2 80	3 80	52 668	9 447	26 653	0	6 490	0 00	0	0	95 258
Task 3 Pilot Projects Selection and Support	22 40	30 40	421 344	75 574	213 224	200 000	51 920	1 50	28 215	120 000	1 110 277
	28 00	38 00	526 680	94 468	266 530	200 000	64 900	1 50	28 215	120 000	1 300 793
Grant Funds											5 000 000
Long-Term Advisor		60 00									192 010
Field Office Costs											286 000
TOTAL	140 00	234 80	2 633 400	434 553	1 551 735	250 000	377 854	9 00	169 290	600 000	11 494 842

Exhibit 4 Assumptions and Unit Costs

LABOR ($/month)			
days per month		**22**	
Expatriate (non-training)	%		
Senior		**70%**	**19,800**
Mid-Level		**30%**	**16,500**
Weighted Average			18,810
Weighted Average Daily Rate			855
Expatriate (training)	%		
Senior		**70%**	**19,800**
Mid-Level		**30%**	**16,500**
Weighted Average			18,810
Weighted Average Daily Rate			855
Local/CCN (non-training)	%		
Senior		**60%**	**2,970**
Mid-Level		**40%**	**1,760**
Weighted Average			2 486
Weighted Average Daily Rate			113

TRAINING ACTIVITIES	Unit Cost	Exp Labor Component (p/m)
course	**40,000**	**0 5**
long workshop (1 week)	**20,000**	**0 25**
short workshop (1-2 days)	**10,000**	**0 25**
new course	**50,000**	**1**

OTHER DIRECT EXPENSES

Travel-Related	
Expat LOE in Field (%)	80%
LOE days per trip	20
weekend factor	1 17
airfare/transfers (per trip)	3 500
per diem (avg)	240
local travel (per day)	15
CCN LOE in field (%)	0 1
CCN local travel per day	10
Equipment/Commodities	activity- or task-specific
Other Costs (per expat month)	100

Exhibit 5a Long-Term Advisor and Field Office Costs Component 1

Long-Term Advisor

	unit rate	1 Year 1	2 Year 2	3 Year 3	4 Year 4	5 Year 5	Total
Salary	19 500	234,000	234 000	234 000	245,700	245 700	1,193,400
units		12	12	12	12	12	60
Post Differential	10,500	10 500	10 500	10,500	10 500	10 500	52 500
units		1	1	1	1	1	
Housing	36 000	36 000	36,000	36 000	36,000	36 000	180,000
units		1	1	1	1	1	
Moving/Storage	15 000	15,000	3 000	3 000	3,000	15 000	39,000
units		1	0 2	0 2	0 2	1	
Education	10,000	10,000	10 000	10,000	10 000	10 000	50 000
units		1	1	1	1	1	
R&R/Home Leave	8,000	0	8 000	16,000	8 000	0	32 000
units			1	2	1		
TOTAL		305 500	301 500	309,500	313 200	317,200	1 546 900

Field Office

	unit rate	1 Year 1	2 Year 2	3 Year 3	4 Year 4	5 Year 5	Total
Rent/Utilities	30,000	30,000	30 000	30,000	30,000	30 000	150,000
units		1	1	1	1	1	
Local Support Labor	30,000	30 000	30,000	30,000	30 000	30,000	150 000
units		1	1	1	1	1	
Vehicle	25 000	25 000	2 500	2,500	7,500	2 500	40,000
units		1	0 1	0 1	0 3	0 1	
Office Equipment/Build-Out	35,000	35 000	3 500	10,500	10 500	3,500	63 000
units		1	0 1	0 3	0 3	0 1	
Other	6 000	6,000	6 000	6,000	6 000	6 000	30,000
units		1	1	1	1	1	
TOTAL		126 000	72,000	79 000	84,000	72,000	433,000

Exhibit 5b Long-Term Advisor and Field Office Costs Component 2							
Long-Term Advisor							
	unit rate	1 Year 1	2 Year 2	3 Year 3	4 Year 4	5 Year 5	Total
Salary	2,925	35 100	35,100	35,100	36 855	36,855	179,010
units		12	12	12	12	12	60
Post Differential	10 500	0	0	0	0	0	0
units							
Housing	36,000	0	0	0	0	0	0
units							
Moving/Storage	5,000	5 000	1,000	1,000	1 000	5 000	13,000
units		1	0 2	0 2	0 2	1	
Education	10,000	0	0	0	0	0	0
units							
R&R/Home Leave	8 000	0	0	0	0	0	0
units							
TOTAL		40,100	36,100	36 100	37,855	41,855	192,010
Field Office							
	unit rate	1 Year 1	2 Year 2	3 Year 3	4 Year 4	5 Year 5	Total
Rent/Utilities	18,000	18,000	18 000	18,000	18,000	18 000	90,000
units		1	1	1	1	1	
Local Support Labor	20 000	20,000	20,000	20 000	20,000	20,000	100 000
units		1	1	1	1	1	
Vehicle	25 000	25,000	2 500	2,500	7 500	2 500	40,000
units		1	0 1	0 1	0 3	0 1	
Office Equipment/Build-Out	20 000	20,000	2,000	6 000	6 000	2,000	36 000
units		1	0 1	0 3	0 3	0 1	
Other	4,000	4,000	4 000	4,000	4,000	4 000	20 000
units		1	1	1	1	1	
TOTAL		87 000	46,500	50,500	55 500	46,500	286,000

Exhibit 5c Long-Term Advisor and Field Office Costs Component 3

Long-Term Advisor

	unit rate	1 Year 1	2 Year 2	3 Year 3	4 Year 4	5 Year 5	Total
Salary	19 500	234 000	234 000	234 000	36,855	36 855	775 710
units		12	12	12	12	12	60
Post Differential	10 500	10 500	10 500	10,500	0	0	31,500
units		1	1	1			
Housing	36 000	36 000	36 000	36,000	0	0	108,000
units		1	1	1			
Moving/Storage	15 000	15 000	3 000	3 000	0	0	21,000
units		1	0 2	0 2			
Education	10 000	10,000	10 000	10 000	0	0	30 000
units		1	1	1			
R&R/Home Leave	8 000	0	8 000	0	0	0	8 000
units			1				
TOTAL		305 500	301 500	293 500	36 855	36,855	974 210

Field Office

	unit rate	1 Year 1	2 Year 2	3 Year 3	4 Year 4	5 Year 5	Total
Rent/Utilities	30 000	30 000	30 000	30 000	30,000	0	120,000
units		1	1	1	1		
Local Support Labor	30 000	30 000	30 000	30,000	30,000	30 000	150,000
units		1	1	1	1	1	
Vehicle	25 000	25 000	2 500	2,500	2 500	2 500	35 000
units		1	0 1	0 1	0 1	0 1	
Office Equipment/Build Out	35 000	35 000	3 500	10 500	3 500	3 500	56,000
units		1	0 1	0 3	0 1	0 1	
Other	6 000	6 000	6 000	6 000	6 000	6 000	30 000
units		1	1	1	1	1	
TOTAL		126 000	72 000	79 000	72 000	42 000	391 000

ECO Project Timeline

Year: 1998 | 1999 | 2000 | 2001 | 2002 | 2003

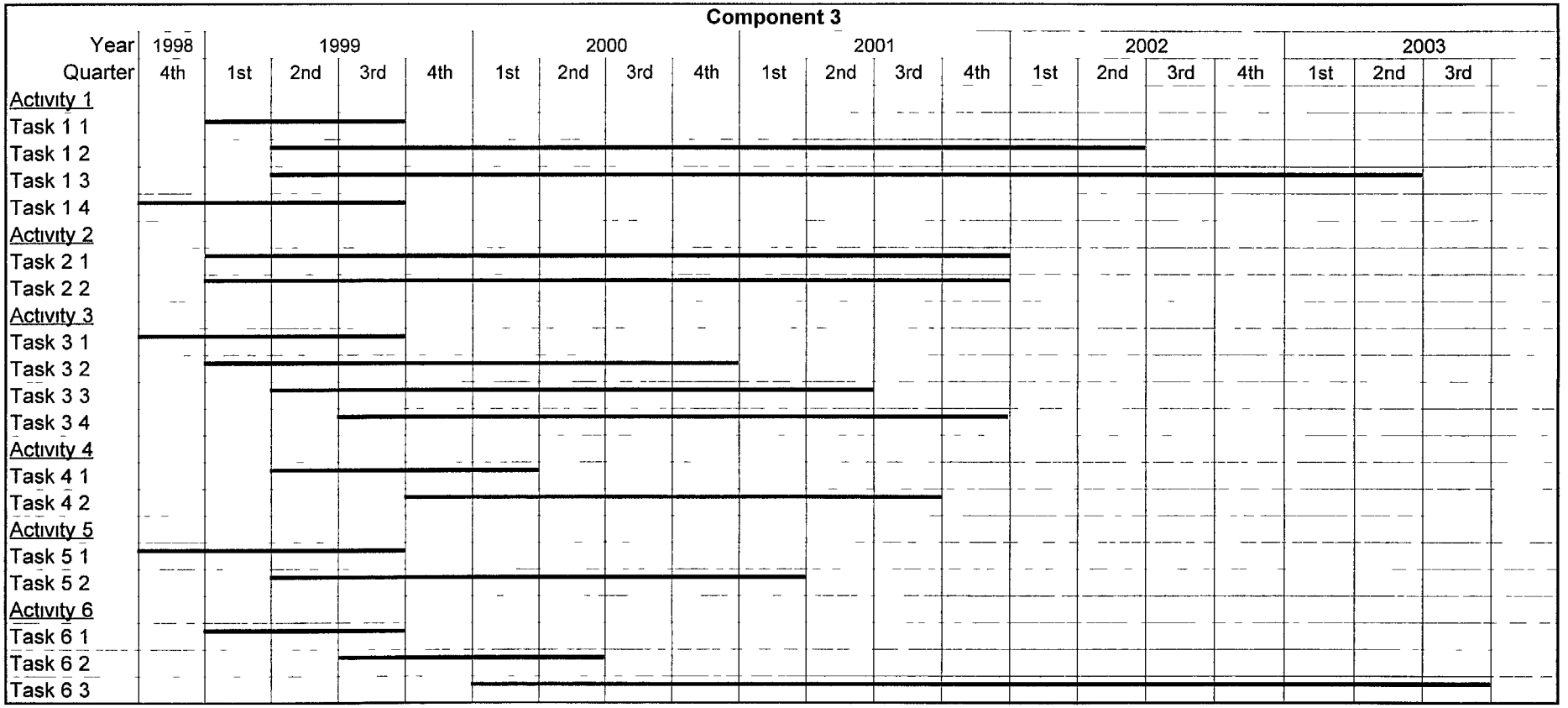
Quarter: 4th | 1st | 2nd | 3rd | 4th | 1st | 2nd | 3rd | 4th | 1st | 2nd | 3rd | 4th | 1st | 2nd | 3rd | 4th | 1st | 2nd | 3rd

Component 1

- Activity 1
  - Task 1 1
  - Task 1 2
  - Task 1 3
- Activity 2
  - Task 2 1
  - Task 2 2
  - Task 2 3
- Activity 3
  - Task 3 1
  - Task 3 2
  - Task 3 3
- Activity 4
  - Task 4 1
  - Task 4 2

Component 2

- Activity 1
  - Task 1 1
  - Task 1 2
  - Task 1 3
  - Task 1 4
- Activity 2
  - Task 2 1
  - Task 2 2
  - Task 2 3
  - Task 2 4
- Activity 3
  - Task 3 1
  - Task 3 2
  - Task 3 3
  - Task 3 4
- Activity 4
  - Task 4 1


Component 3
Year
1998
1999
2000
2001
2002
2003
Quarter
4th
1st
2nd
3rd
4th
1st
2nd
3rd
4th
1st
2nd
3rd
4th
1st
2nd
3rd
4th
1st
2nd
3rd
Activity 1
Task 1 1
Task 1 2
Task 1 3
Task 1 4
Activity 2
Task 2 1
Task 2 2
Activity 3
Task 3 1
Task 3 2
Task 3 3
Task 3 4
Activity 4
Task 4 1
Task 4 2
Activity 5
Task 5 1
Task 5 2
Activity 6
Task 6 1
Task 6 2
Task 6 3