

Final Report

Regulatory Reform and
Restructuring Activities

September 2000

Task Order No. 804
Contract No. PCE-I-00-96-00002-00

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Regulatory Reform
And
Restructuring Activities

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Submitted by:
International Resources Group, Ltd.

Prepared for:
USAID/India

Environmental Policy and Institutional Strengthening Indefinite Quantity Contract (EPIQ)
Partners: International Resources Group, Winrock International, and Harvard Institute for International Development

Subcontractors: PADCO; Management Systems International; and Development Alternatives, Inc.

Collaborating Institutions: Center for Naval Analysis Corporation; Conservation International; KBN Engineering and Applied Sciences, Inc.; Keller-Bleisner Engineering; Resources Management International, Inc.; Tellus Institute; Urban Institute; and World Resources Institute

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Mr. Leasburg has extensive experience in power sector restructuring and regulatory issues and the development of private power generation facilities. He led the IRG-implemented, USAID-funded, five-year program in Pakistan to develop the structure for power sector commercialization and privatization and creation of the regulatory commission. In Russia, he assisted the Government in the formation of the Federal Energy Commission and worked with regulators in one region to adopt a US cost-of-service model for rate cases. He has prepared and participated in rate cases before the Virginia State Corporation Commission. He also participated in utility groups persuading the US Congress to adopt the Nuclear Waste Policy Act, which committed the government to provide storage for spent nuclear fuel, and the Fuel Use Act, which allowed the use of natural gas as fuel in central generation stations.

Mr. Leasburg has served in a variety of senior-level positions within the US electric utility industry, including Senior Vice President of Engineering and Construction for Virginia Electric and Power Company; Senior Vice President, Engineering, for Dominion Resources, Inc.; and President of Dominion Energy. His management and technical experience includes power generation; power plant engineering and construction; corporate environmental management; transmission and distribution planning, project engineering, licensing, and construction; negotiation of power purchase contracts and agreements; and development, financing, construction, and operation of cogeneration and private power projects.

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Preface

The author thanks the many persons and organizations that contributed to the success of the Regulatory Reform and Restructuring Project. Project COTR Mr. N. V. Seshadri was most helpful and provided important guidance throughout the project. His insights and knowledge of the India Power Sector are second to none. Mr. Richard Goldman, former Director of the USAID Energy Program, and Mr. Richard Edwards, current Director, both provided highly useful insight for the project. Mr. JiJi Thompson, Director of the Ministry of Power, Reform Cell, provided important input on the Indian Power Sector, along with always being ready to arrange meetings and appointments. The Power Finance Corporation provided important information regarding several states undergoing restructuring and establishing regulatory commissions, especially Messrs. Saxena and Khan. Professor Rao, Chairman of the Central Electricity Regulatory Commission, was an inspiration to me; he is the key individual responsible for bringing reason into the regulatory process in India. With people like Professor Rao guiding the formation of Electricity Regulatory Commissions, India can expect great results. At the end of the day, it is the counterparts that must be given due credit for the accomplishments of the project, the SEBs and Regulatory Commissions, their management and staffs, which implement the programs and become professionals in their new endeavors. Many thanks also go to the specialists and consultants from the US and India who contributed in the success of the R-3 project and found their ways into remote locations in India. In addition, thanks to the IRG staff in Washington, particularly Dr. Charles Ebinger who has moved on to other opportunities and to Ms. Mary Webster. Lastly, I want to personally thank the local IRG staff in India for putting up with me during the past nearly three years. Each of them, Ritika, Nims, Haque, Deepan and later joined by Brinder played a large part in making the project a success. I owe each of them more than can ever be expressed in this short acknowledgement. None of the above-mentioned persons or organizations is responsible for the errors you may find in this report. These can only be the fault of the author!

Acronyms

ADB	Asian Development Bank
APERC	Andhra Pradesh Electricity Regulatory Commission
ASCI	Administrative College India
CERC	Central Electricity Regulatory Commission
CIDA	Canadian International Development Agency
COP	Chief of Party
CTI	Clean Technology Initiative
DFID	UK Department for International Development
DSM	Demand Side Management
ECO	Energy Conservation and Commercialization Project
EETP	USAID Global Bureau Energy & Environment Training Program
EMCAT	Energy Management, Training and Consultation Project
EPIQ	Environmental Policy and Institutional Strengthening Indefinite Quantity Contract
GEP	Greenhouse Gas Emission Project
GERC	Gujarat Electricity Regulatory Commission
GOI	Government of India
GWH	Giga Watt Hour
HERC	Haryana Electricity Regulatory Commission

HIID	Harvard Institute for International Development
HSEB	Haryana State Electricity Board
HVPNL	Haryana Vidyut Prasaran Nigam Ltd.
IIE	Institute of International Education
IPP	Independent Power Producer
IR	Intermediate Result
IRG	International Resources Group, Inc.
IRP	Integrated Resource Plan
kg	Kilogram
MOP	Ministry of Power
NARUC	National Association of Regulated Utility Commissioners
NTPC	National Thermal Power Corporation
PFC	Power Finance Corporation
R&M	Rehabilitation and Maintenance
R-3	Regulatory Reform and Restructuring Project
SARI	South Asia Regional Initiative
SEB	State Electricity Board
SERC	State Electricity Regulatory Commission
T&D	Transmission and Distribution
TDY	Temporary Duty
TERI	Tata Energy Research Institute

UPERC Uttar Pradesh Electricity Regulatory Commission

USAID US Agency for International Development

USEA United States Energy Association

WB World Bank

WBERC West Bengal Electricity Regulatory Commission

Executive Summary

India's power sector, extremely inefficient at the beginning of Regulatory Reform and Restructuring Project (R-3), remains so even today. Most State Electricity Boards (SEBs) continue near bankruptcy because of several factors—tariff structures not in line with cost of service; technical inefficiencies within the generation, transmission, and distribution systems; and power theft in many forms in the distribution sector. The environmental impact of the power sector is well-described in other documents. With generation operating at efficiencies of 24 percent to 30 percent and distribution losses in most states above 40 percent, it is easy to imagine the benefits even small improvements in any part of the power sector would bring.

The Regulatory Reform and Restructuring Project (R-3) had as its primary objectives to:

- Assist the Government of India in promoting improvement in the power sector through government-owned and -operated State Electricity Boards restructuring; and
- Help establish a regulatory structure for the electric power industry.

The Central Electricity Regulatory Commission, CERC, was authorized by The Electricity Regulatory Commissions Bill of June 1998 and formed immediately thereafter. IRG provided consultation on the legislation establishing CERC and provided a White Paper commenting on draft legislation. Nearly all comments were included in the final bill passed by Parliament. The bill established CERC as the regulator of all interstate transmission of electricity, the licensor of Independent Power Plants engaged in selling into the interstate transmission grid, and the regulator of tariffs from these same plants. IRG provided training for the commission and staff, including training at US training centers.

Two SERCs West Bengal and Uttar Pradesh, have been established as direct result of IRG support. Others, Haryana, Andhra Pradesh and Gujarat, have benefited from significant IRG technical assistance and training during their formation and startup.

Electricity Regulatory Commissions in India have a substantial beginning but will need support to add other states to the regulatory list and to grow each commission into a sustainable organization. As regulatory commissions mature, they are becoming the interface between the suppliers of electricity and customers using electricity in addition to their classic roles as regulators. The interface between customers and regulators will become the most important function provided by regulators. At this interface, customers of all classes are finding a voice that they never had under the SEB regimes. Many reforms in the US,

including the importance of energy efficiency, demand-side management; co-generation, and renewables were and are driven by the presence of the intervenors (utility customers) before the commissions in rate hearings. It will be no different in India.

Restructuring in India has not yet reached an aggressive implementation mode. Only six states have formally entered restructuring of any sort. The Lead State is Orissa, which has reached privatization in portions of their generation and distribution systems. This work in this state was in progress when the R-3 Project was started. IRG supported the restructuring of the Haryana SEB. This State has unbundled generation, transmission, and distribution into separate corporate entities. Distribution was separated further into two separate commercial entities. Expressions of interest have been sought for purchasing a majority interest in one distribution zone. Commercial organizational structures have been established in all entities of the former SEB. Support was provided to the generation and transmission units in the preparation of rate cases for presentation to the regulatory commission.

The Union Government legislation allows states to restructure their State Electricity Boards and to create State Electricity Regulatory Commissions. Dates for final implementation of both restructuring of the SEBs and establishing the regulatory commissions have been agreed at Chief Minister meetings; however, the dates have come and gone. New legislation, The Electricity Bill 2000, is being prepared under the sponsorship of the Ministry of Power. This bill requires states to restructure their SEBs into separate corporate entities, which are to operate with separate accounts and have separate tariff structures based on cost of service. The generation, transmission, and distribution entities may be further separated or privatized at the discretion of each state. IRG provided comments and a formal paper to the Ministry of Power, Reform Cell and the Cohello Commission outlining the restructuring options for SEBs. IRG has also reviewed and provided comments on the proposed Electricity Bill 2000, which is now in its sixth revision. A renewed interest in restructuring SEBs is developing as the R-3 Projects ends.

IRG conducted a series of distribution system efficiency improvement courses for the Haryana SEB, as they were unbundling their SEB into generation, transmission, and two distribution companies. This one-week course was presented six times at different substations and with different work crews throughout the Haryana distribution system. In preparation for this work, IRG conducted a survey of the distribution system organizational development and training programs, operation and maintenance practices, transformer failures and transformer repair procedures, switchyard installation and maintenance, and spare part management. IRG also reviewed the procedures and practices of the subcontractor personnel retained by HSEB.

Because of the in-depth analysis made at switchyards during the training activities, IRG was able to estimate the HSEB transmission and distribution (T&D) annual system energy losses at 3993 GWH or 31.4 percent of the total energy produced. This consisted of both commercial and technical losses. Rigorous implementation in the distribution system switchyards of the measures outlined in the IRG report, *System Efficiency Improvement Training Report*, could reduce the technical losses by 1000 GWh annually, which alone would eliminate 25 percent of the total system losses. Assuming that power saved would originate from coal-based power stations—a reasonable assumption since Hydel is base loaded and is not sufficient for demand—*fixing these loss problems would save about 690 million kg of coal and over 858 million kg of carbon dioxide annually.*

A particularly successful method of working with regulatory commissioners developed during the project. IRG used the two-week course in the US at Florida State or the University of Michigan as the base for initial training and subsequently arranged visits with the commissioners at their offices. One or two US Regulators would spend two or three days with the commission and staff coaching them on particular current and relevant issues. Support for commissioners is highly important and should continue in some form, as partnerships, US training, coaching or local classes and seminars. While it will become more difficult to get significant time with developed commissions, they will need further support as complex issues arise. Coaching offers one of the best techniques to provide this assistance.

1. Introduction

Regulatory Reform & Restructuring (R-3) Concept

India's power sector, highly inefficient at the beginning of R-3, remains so even today. Most State Electricity Boards (SEBs) remain near bankruptcy because of several factors—tariff structures not in line with cost of service; technical inefficiencies within the generation, transmission, and distribution systems; and power theft in many forms in the distribution sector. The environmental impact of the power sector is well-described in other documents. With generation operating at efficiencies of 24 percent to 30 percent and distribution losses in most states above 40 percent, even small improvements in any part of the power sector will likely bring substantial benefits.

A major impediment to improvement within the power sector was the absence of regulatory bodies to oversee and regulate the industry. A specific objective of SO-4, IR 4.1.3 was the creation of “Improved policy, legal and regulatory framework for increased power sector efficiency.” EMCAT R-3 was designed to lead to this specific achievement. By providing technical assistance, training, and related support for GOI and State Agencies, including newly formed regulatory bodies, the objective would be realized.

Task Order Award

USAID/India awarded the Regulatory Reform and Restructuring (R-3) Activities under the EMCAT program to IRG in May 1997 with the performance period being June 1, 1997 through September 30, 1999. R-3 was designed to contribute to USAID/India's Strategic Objective: “increased environmental protection in energy, industry and cities,” and to achieving the Strategic Objective's first Intermediate Result: “increased efficiency and decreased pollution in energy supply and use by improving the efficiency of the electric supply system.”

2. Background

Energy Management Consultation and Training Project (EMCAT)

The USAID evaluation of the EMCAT Program in 1996 showed substantial progress in institutional development and the role of independent power producers (IPPs) in the power sector. However, the financial health of the power industry and its ability to meet the growing power demands of India actually declined during the period 1990 through 1996. Recognizing this, the GOI decided to move toward a major restructuring of the power sector that would concentrate on creating a financially healthy sector through regulation of a commercialized and increasingly privatized sector structure. In response to the GOI initiative, USAID designed the second phase of EMCAT to focus on power sector regulatory reform and restructuring.

R-3 Design

The R-3 Project's major thrust is the recognition that power sector restructuring, with tariffs rationalization and placing all power sector aspects on a commercially sound basis as its central objective, is an essential prerequisite for closing the gap that now exists between India's needs and India's electric power supply capabilities. With India's power sector moving towards restructuring, USAID efforts were designed to build GOI capability to manage changes effectively and promote favorable outcomes. The favorable outcomes sought with R-3 included improved power quality and availability, lower real costs for power delivery, increased industrial competitiveness for the Indian economy, and substantial environmental benefits of global significance through reduction of air pollutants (including greenhouse gasses), water pollution, and land degradation.

R-3 provided technical assistance training and related support for GOI and State agencies, including newly formed regulatory commissions. IRG support for R-3 was provided in coordination with the Ministry of Power, Reform Cell and with the Power Finance Corporation (PFC). PFC identified "Reform States" in the early phases of restructuring or establishing regulatory commissions. Support could be provided to selected reform states with approval of USAID. IRG could separately identify particular states, with USAID concurrence, in which to provide reform technical assistance.

The project was expected to coordinate and integrate activities with the United States Energy Association (USEA), the Institute for International Education (IIE), the EMCAT-DSM (Demand Side Management) project, and other organizations within the overall EMCAT Program. Close relationships were to be established with the World Bank, Asian

Development Bank, the UK Department for International Development (DFID), and the Canadian International Development Assistance (CIDA) group.

IRG R-3 Tasks

IRG activities provided technical assistance, training, and related support for GOI and state agencies concerned with electric power in the following six general areas:

Regulatory Reform: Establishment of electric power regulatory commissions at Union and State levels, with the functions of these commissions to include tariff rationalization and other measures designed to place the electric power sector on a sound economic footing;

Utility System Restructuring: Identification and wide dissemination of information in the India Power Sector about alternative, bankable ways of restructuring SEBs and other utilities for cost-effective operation, including options such as integrated resource planning, unbundling, commercialization, and partial or full privatization;

Private Sector Power Generation: Development of standard documentation for contractual agreements between IPPs and their bulk power customers;

Private Sector Power Transmission: Identification and documentation of ways to put private sector investment and entrepreneurial skills to work in the building, operation, and ownership of transmission lines;

Private Sector Renovation and Modernization of Plant: Identification of obstacles to private sector investment in Renovation and Modernization (R&M) of existing public sector power generation facilities. These facilities now operate inefficiently because of public sector agency inability to fund adequately, to perform necessary maintenance and upgrades, and to develop bankable approaches to surmounting those obstacles; and

Financial Resources for Restructuring and Expansion: Identification of and planning for utilization of private sector sources of debt and equity funds for the continued expansion, upgrading, and restructuring of the India power sector, with special emphasis on domestic funding.

Shift in Project Focus

In the contract awarding the IRG R-3 Task Order, USAID recognized that the situation in India may change over the project's time frame and that work focus could shift accordingly. In May 1998, the project faced a period of uncertainty when the "Glenn Amendment" came into force following India's detonation of several nuclear devices. By this time, the project

was proceeding at a rapid pace. Work was placed on hold by USAID pending the outcome of program reviews. It was finally decided by USAID that, since the work-in-progress related to regulatory reform and restructuring was exempted from sanction, it could continue. However, sanctions required multi-lateral development banks, such as the World Bank, not to commit new loans for infrastructure development. This effectively cut support for R&M projects, private transmission projects, and major upgrading projects. Loans currently committed at that time, i.e., the World Bank loan for Haryana restructuring and upgrade of the distribution system, were allowed to continue, but new loans were questionable. Restarting the work after about a two-month hiatus required much discussion with affected counterparts and partners. They had real concern that we would not fulfill our commitments and that we would find a way to pull out of the project again. The restart required more effort than initial project startup.

Two general elections, especially the first, also had an impact on the project. During the election campaigns, it was very difficult to get decisions at the center and state governments, and the SEBs took a “wait and see” position until after the election until they knew which way the government would turn. Fortunately, the new government continued the reform programs; however, there was a delay impact.

Project Extension

In May 1999, USAID initiated discussions to extend the contract completion date. Funds that were not projected to be used because of the project slow-down and certain limitations because of sanctions were utilized to extend the project completion date from September 1999 through September 2000. No new funds were included in this amendment. The tasks approved during the amendment period included continued support for regulatory reform and completion of Phase I of the commercialization task in progress in the Punjab. The Punjab task was limited to issuing the final report for Phase I work. The extension allowed an overlap with other new USAID projects that also experienced delayed starting because of sanctions.

3. IRG Task Order Summary

Work Plan Concept

A Work Plan was prepared and submitted to USAID for approval. This plan was revised in November 1997. However, actual work approval by USAID for any task required a well-developed Task Order. It was then agreed to submit Task Orders that included a Scope of Work, tasks to be performed, the objective of the task, deliverables, level of effort, assigned personnel, and a timetable for the work. All work planning and performance was embedded in the Task Orders.

Task Order Summary

A total of 26 task orders were prepared throughout the project. Each task order was prepared after discussions with the appropriate counterparts and with USAID. Thirteen task orders were approved for implementation. USAID withheld approval of several Task Orders because, in their view, states selected for assistance by PFC were not fully committed to reform. In a few cases, some portions of rejected Task Orders were included in later Task Orders that were approved for implementation.

A complete Task Order Summary is included at Appendix 1.

Association with USAID EMCAT Organizations and with Other Development Groups

The IRG R-3 Project coordinated its activities with several other projects and agencies. IRG managed two other USAID projects that ran concurrently with R-3—DSM and the Clean Technology Initiative (CTI). R-3 and DSM cooperated as a team in Haryana. The Haryana State Electricity Board was undergoing restructuring, and both projects assisted in this activity. Equipment and computer programs purchased for R-3 projects were utilized by DSM in their work in Haryana, as well as in other States. TDY personnel could be effectively used on each project. Information and reports were shared, which avoided repeating some work.

The work in Haryana required coordinating efforts with the World Bank (WB), the UK Department for International Development (DFID), and the Canadian International Development Agency (CIDA). Work in Haryana, supported by USAID, DFID, and CIDA, attracted a loan from the World Bank primarily in support of SEB restructuring and distribution system efficiency improvements. Covenants in the World Bank loan required progress in separating the SEB into three commercial entities, transmission, generation, and distribution and, further, selecting one distribution system for privatization. Early in the

program, a Coordination Group was convened between the parties that also included the Secretary of Power from the Government of Haryana, the HSEB Chairman, and other officers. Quarterly coordination meetings were held that resulted in close cooperation between the parties. In addition to presentation of progress reports at these meetings, the committee ascertained that assistance overlaps did not occur and that all areas of needed assistance were being addressed. Regular contacts were maintained between the quarterly meetings. Reports were shared between all parties. Following the nuclear detonations by India, CIDA withdrew and did not return to the meetings. IRG was required to curtail efforts until sanctions were reviewed. During the sanctions review period, certain CIDA and IRG tasks were taken up by DFID. Coordination with all parties continued up to the end of the IRG tasks at Haryana. One of the reports issued by IRG during the Haryana task, which described loss reduction and efficiency improvement in the Haryana distribution system, received very high accolades from the World Bank. “The Bank staff was absolutely delighted with the quality and usefulness of the document, that they wanted to circulate it widely, and that the reviewing Bank staff were notoriously tough to please. Kudos to everyone who worked on the product.”

The United States Energy Association (USEA) established several utility and regulatory partnerships in India under their USAID program. IRG worked very closely with USEA throughout the project. Assistance was provided by IRG to set up seminars when USEA-sponsored US Utility Regulators were in India for partnership meetings. IRG also set up separate meetings with CERC and SERCs to take advantage of USEA sponsored regulators being in India. USEA and IRG cooperated in selecting individual regulators for training at US regulatory training programs at Florida State University and at the University of Michigan. USEA and IRG also cooperated on study tours to the US by Indian regulators to visit the Federal Energy Regulatory Commission, US State Utility Commissions, utilities, power pools, and regional transmission grid control centers.¹

IRG cooperated with the Institute for International Education (IIE), which conducted an energy-training program in India under a USAID contract. IRG suggested courses for inclusion in the IIE training program in India and promoted attendance at the IIE courses among the states where IRG was working. IRG also nominated participants for three different courses that IIE conducted under a program with the USAID Global Bureau, EETP, in the US.

¹ The cooperation between the R-3 Project and USEA provided significant advantages for both projects and should be required if USAID continues with any further regulatory commission support.

IRG and the Asian Development Bank (ADB) agreed to cooperate in West Bengal. The State of West Bengal had requested assistance from USAID through PFC for creation of a Rural Electrification Program and the formation of the state regulatory commission. During the initial phases of the program, it was determined that ADB was also planning work in each of these areas in West Bengal. During subsequent discussion with ADB, it was agreed that IRG would work with the formation of the West Bengal Electricity Regulatory Commission, and ADB would assist West Bengal with the Rural Electrification program.

IRG also cooperated with the World Bank in Uttar Pradesh and the Punjab. This cooperation mainly took the form of briefings for bank personnel and providing copies of reports to the bank. Bank input was used in the development of assistance in these states. The World Bank recently announced a loan of \$650 million to the UP Power sector. One of the important consideration in obligating these funds was the presence of the UPERC, which was formed with the assistance of the R-3 Project.

IRG worked for a short time with CIDA developing Transmission Grid Codes for the Central Electricity Regulatory Commission (CERC). The IRG Chief of Party (COP) served on a CERC committee along with Power Grid to develop draft grid codes.

A summary of principal contacts with GOI, State, Regulatory and others established during the R-3 Project is included at Appendix 4.

4. IRG Training Activities

IRG provided training throughout the R-3 Project, including workshops, seminars, on-the-job training, and courses. Most of the events were conducted by IRG. Others sponsored some of the events and IRG provided significant input through material, lecturers, selection and nomination of participants, and recommendations for specific courses to other USAID projects. Training was also provided on a one-to-one basis, or to a group of two or three regulators or regulatory staff. This targeted training usually lasted for one to two days each and dealt with specific, current topics of interest to regulators. Regulators and some of their staffs at CERC, WBERC, HERC, UPERC, APERC, and GERC received this training. Topics covered with this targeted training included:

- Utility and Regulatory Accounting;
- Regulatory Organization and Staff Qualification;
- Organizational Training and Development;
- Review of Power Purchase Agreements entered into by Regulated Entities;
- General Methodologies for Tariff Settings and Filings;
- Review of Rate Case Applications;
- Tariff Incentive Mechanisms for Performance Improvement;
- Integrated Resource Planning;
- Transmission Tariff Setting;
- Transmission Grid Code Development, and
- Other topics.

A complete summary of the formal training provided by IRG or sponsored by others with IRG participation is provided at Appendix 2. Targeted training provided for regulators is included in Task Orders, primarily Task Order 27.²

Investment Appraisal and Risk Analysis for the Power Sector

IRG sponsored a course for the Power Finance Corporation, Ministry of Power, and State Electricity Boards at the National Institute for Financial Management located at Faridabad, India, January 5 to January 23, 1998. Glenn P. Jenkins and Associates from Cambridge, Maine, conducted the course. This group is composed of persons associated with Harvard University and the Harvard Institute for International Development. This intensive three-week course was designed to give the participants operational skills in the preparation and analysis of feasibility studies in the power sector. The course covered the financial, economic, risk, and distributive analysis aspects of such feasibility studies. The participants were trained to do the analyses using the computer-based spreadsheet EXCEL and the software package RISKMASTER, two important tools used in carrying out the analyses. During the course, each participant completed two cases dealing with the evaluation of a project from alternative points of view and the timing of each project. Additionally, each participant completed a comprehensive case that required financial, economic, risk, and distributive analysis done in an integrated fashion. Different types of power purchase agreements based on actual power projects were built into the cases, so participants were dealing with real-life issues rather than academic problems. Thirty-nine persons completed the course. A comprehensive set of training manuals was provided to each participant.

Regulatory Training in the United States

In addition to the training provided in India, IRG sponsored participants at two different US College campuses for Regulatory Studies Programs. The first course was held at Michigan State University at East Lansing, Michigan and was co-sponsored by the Institute of Public Utilities at Michigan State University and the National Association of Regulated Utility Commissioners (NARUC). The second course was held at the University of Florida at Gainesville, Florida, and was sponsored in collaboration with the World Bank and the Public Utility Research Center at the University of Florida. Both of these courses are highly

² Targeted Training for commissions refers to the sessions held with commissioners and staff in the states where IRG provided support and with CERC at the Center. The respective commissions primarily determined the subjects covered. IRG utilized TDY personnel with regulatory backgrounds for this work. Some of this training was arranged by IRG utilizing US regulatory personnel in country for USEA Partnership Programs. **A compilation of trip reports associated with this support can be found at Appendix 6.**

recognized and not only expose the participants to the basic knowledge required for regulators, but since they attract participants internationally, allow significant interaction between participants. Each two-week course has international student participation, along with international faculty. IRG sponsored nine participants at the Michigan course at two different periods. Five participants were sponsored at the Florida course at two different periods. **A list of Regulators and other government officials participating in this training is attached at Appendix 3.**

Each course focused on several broad topics that are important to reforms and regulatory commissions being established in India:

- Market Structure Reform and Regulation of Network Industries,
- Financial Analysis for Utility Regulation,
- Principles and Application on Incentive Regulation,
- Non-Price Aspects of Utility Regulation,
- Managing the Introduction of Competition in and for the Market,
- Rate Structure, and
- Managing the Regulatory Process.

Additionally, IRG selected and nominated six persons to attend the EETP “Implementation of Power Sector Reforms and Utility Regulation” course conducted by IIE and held October 11 through November 5, 1999, at Portland Maine. This course was well-received by the participants with the only objection being the length of time away from their normal duties. The course consisted of the following main topics:

- Introduction and Overview of Regulation,
- Commission Structure and Function,
- Setting Cost-based Utility Rates,
- Group Exercise: Mock Rate Case, and
- Mock Regulatory Hearing.

Workshops and Seminars

IRG conducted 18 seminars, workshops, and courses throughout the project in India or was one of the lead presenters at seminars sponsored by others. (See **Appendix 2 attached**). These activities are in addition to those targeted sessions for State and Center Regulators. These sessions were primarily devoted to SEB restructuring, utility financial operations, distribution system efficiency improvement opportunities, distribution system preventative maintenance, rate case and tariff-setting programs, and utility operations under a regulatory regime.

Discussion of Other Selected Training Activities

Haryana SEB Restructuring and Efficiency Improvement Training Activities

IRG conducted a series of distribution system efficiency improvement courses for the Haryana SEB, as they were unbundling their SEB into generation, transmission, and two distribution companies. This one-week course was presented six times at different substations and with different work crews throughout the Haryana distribution system. In preparation for this work, IRG conducted a survey of the distribution system organizational development and training programs, operation and maintenance practices, transformer failures and transformer repair procedures, switchyard installation and maintenance, and spare part management. IRG also reviewed the procedures and practices of the subcontractor personnel retained by HSEB.

Because of the in-depth analysis made in switchyards during the training activities, IRG was able to estimate the HSEB T&D annual system energy losses at 3993 GWH or 31.4 percent of the total energy produced. This consisted of both commercial and technical losses. Rigorous implementation in the distribution system switchyards of the measures outlined in the IRG report, *System Efficiency Improvement Training Report*, could reduce the technical losses by 1000 GWh annually which alone would eliminate 25 percent of the total system losses. Assuming that power saved would originate from coal-based power stations—a reasonable assumption since Hydel is base loaded and is not sufficient for demand—fixing these loss problems would save about 690 million kg of coal and over 858 million kg of carbon dioxide annually.

Several reports, mentioned following, were issued as a result of this work with HSEB:

Review and Recommendations for Directorate Operations and Special Courses in HSEB Commercialization Process, Contractor Training and Safety

This report provides an overview on HSEB; a summary of their training program as it pertains to their distribution system, and detailed proposals for training during and after HSEB

restructuring; a brief overview of HSEB's current area of customer billing; and their maintenance of employee salary and personnel records.

The Haryana Distribution System Efficiency Improvement Training Project

This report set out the scope of work, implementation plan, and schedule of activities for the System Efficiency Improvement Training Project. The primary objective of the training project is to identify distribution system technical losses and identify loss-reduction measures. Training included classroom activities and the use of distribution system analysis and planning software. Field work included training with technical equipment including thermovision scanners, load loggers, voltage monitors, HALO ammeters, and analysis and planning software.

Substation Preventive Maintenance Manual

This manual was prepared after IRG visited several substations to evaluate the large number of distribution system transformer failures. HSEB was procuring \$60 million in equipment for repairs and upgrades to the distribution system with an emergency World Bank loan. Distribution system transformer failures were 33 percent per year and the study of the system revealed several reasons for this high failure rate. The manual was prepared to address these problems and was used in the Efficiency Improvement Training Project.

System Efficiency Improvement Training Report – Final Report (Two Volumes)

This report provides the results of the training program and the as-found condition in each switchyard visited during the training program, and it documents the efficiency improvements possible when the problems are corrected. The World Bank staff was “absolutely delighted with the quality and usefulness of the document, that they wanted to circulate it widely, and that the reviewing Bank staff were notoriously tough to please.” HSEB was requested by the World Bank to focus on problem areas identified in the report. The report, because of wide circulation, generated much interest. Several other SEBs requested presentations of the work and requested assistance in providing training in their organizations. Presentations were made as requested; however, available funds did not allow individual training programs.

Distribution System Computer Modeling

Near the end of the distribution system efficiency improvement training project, a new version of the distribution analysis and planning software was issued. IRG installed this new version on HSEB computers and provided a one-week training program on the new features of the program. The software was turned over to HSEB.

Tariff Rate Case Training

IRG provided training to HSEB personnel in the preparation of rate cases and the presentation of rate cases to the regulatory commission. As part of this training, IRG installed a “Cost of Service” computer model and provided a computer and printer to allow operation of the model. The model was capable of calculating the cost to provide electrical service to different customer classes based on connected load and voltage levels. The computer model was turned over to HSEB along with the equipment.

5. IRG Task Order Accomplishments

Regulatory Reform

Expected Outcome – “A Central Electricity Regulatory Commission functioning with a trained staff and engaged in active regulatory oversight of interstate electric power matters; addressing IR 4.1 and I 4.1.3.”

Actual Outcome – The Central Electricity Regulatory Commission, CERC, was authorized by The Electricity Regulatory Commissions Bill of June 1998 and formed immediately thereafter. IRG provided consultation on the legislation establishing CERC and provided a White Paper commenting on draft legislation. Nearly all comments were included in the final bill passed by Parliament. The bill established CERC as the regulator of all interstate transmission of electricity, the licensor of Independent Power Plants engaged in selling into the interstate transmission grid, and the regulator of tariffs from these same plants. IRG provided training for the commission and staff including training at US training centers. Significant training was provided by having US regulatory personnel consult with CERC Commissioners and staff on matters as they arose, including tariff hearings, incentive tariffs, transmission grid codes, cost of service rate models, quality of service, etc. Assistance was also provided to establish an organization of regulators within India similar to NARUC in the US.

Expected Outcome – Promulgated national tariff guidelines for State Electricity Boards, SEBs, and specified national tariffs and rules published for interstate transmission and dispatch; addressing IR 4.1 and I 4.1.3.

Actual Outcome – Tariff setting in the states has been legislatively assigned to the state regulatory commissions. CERC does not have a state role except for interstate transactions. CERC has established technical and quality rules for the transmission of interstate power with IRG assistance. Hearings have been held in establishing these rules. The IRG COP served on a committee establishing grid codes for the interstate transmission systems. CERC has published an order requiring adoption of an availability tariff by generators supplying power to the national grid. A hearing was held on this order and serious opposition from generators (NTPC) was expressed. IRG provided input to CERC on standards for incentive and availability tariffs in the US.

Expected Outcome – At least two State-level Electricity Regulatory Commissions placed in operation as a concomitant of USAID support, with economically sound programs for tariff

rationalization promulgated in legislation or Commission regulations; addressing IR 4.1 and I 4.1.3.

Actual Outcome – Two SERCs have resulted from direct IRG support, West Bengal and Uttar Pradesh. Others, Haryana, Andhra Pradesh, and Gujarat have benefited from significant IRG technical assistance and training during their formation and startup. A “notification” to establish a regulatory commission in Punjab was prepared by IRG; however, the commission has not yet been established. Specific tariff guidelines have not been established for general tariff determination; however, guidelines for preparing and submitting tariff applications have been established. Specific guidelines have also been established for commercial and technical loss improvements. Most tariff discussions with applicants focus on the financial problems of the SEBS or their successors, which currently borders on or near bankruptcy. Cost-of-service models are being discussed with each commission but the application of these models will result in major changes in tariff levels for various customer classes, since the low cost of service customers currently subsidizes other higher cost customers. It is politically impossible to move to a new tariff structure at this time. New legislation at the Center, “The Electricity Bill 2000,” is being circulated that will require movement towards cost-of-service models, if implemented. Most regulatory action focuses on system efficiency improvement and commercial loss reductions. With commercial and technical losses of over 40 percent in most states, significant improvements will go a long way toward improving financial performance.

Utility Restructuring

Expected Outcome – Adoption of time-phased, articulated restructuring programs, including performance monitoring plans, by at least two utilities as a concomitant to USAID support in this area; addressing IR 4.1 and I 4.1.1, 4.1.2 and 4.1.3.

Actual Outcome – Restructuring in India has not yet reached an aggressive implementation mode. Only six states have formally entered restructuring of any sort. The Lead State is Orissa, which has reached privatization in portions of their generation and distribution systems. This state was in an advanced stage when the R-3 Project was started. The R-3 Project supported the restructuring of the Haryana SEB. This State has unbundled generation, transmission, and distribution into separate corporate entities. Distribution was separated further into two separate commercial entities. Expressions of interest have been sought for purchasing a majority interest in one distribution zone. Commercial organizational structures have been established in all entities of the former SEB. IRG contributed towards restructuring by assisting the distribution companies to prepare for corporatization and eventual privatization, including recommending the organization structure for the distribution companies. Support was provided to the generation and transmission units in the preparation of rate cases for presentation to the regulatory commission, along with the significant training

provided to the distribution sector in this area. Significant training was provided to the SEB as they prepared the organization for restructuring. Assistance was provided to the financial group on dealing with the outside, private financial sector.

Assistance was also provided to Punjab in preparation for restructuring. Punjab decided first to establish profit centers as a step towards commercialization. A final report outlining the formation of profit centers was issued for Punjab; however, time did not permit assisting in the implementation phase of this work.

Expected Outcome – Significant movement toward restructuring, as defined in concrete milestones including the adoption of necessary legislation at the Union and State levels, by at least two SEBS as a concomitant of USAID support; addressing IR 4.1 and I 4.1.1, 4.1.2 and 4.1.3.

Actual Outcome – The Union Government legislation allows states to restructure their State Electricity Boards and to create State Electricity Regulatory Commissions. Dates for final implementation of both restructuring of the SEBs and establishing the regulatory commissions have been agreed at Chief Minister meetings; however, the dates have come and gone. New legislation is being prepared under the sponsorship of the Ministry of Power, “The Electricity Bill 2000.” This bill requires states to restructure their SEBs into separate corporate entities, which are to operate with separate accounts, and have separate tariff structures based on cost of service. The generation, transmission, and distribution entities may be further separated or privatized at the discretion of each state. IRG provided comments and a formal paper to the Ministry of Power, Reform Cell and the Cohello Commission outlining the restructuring options for SEBs.³ IRG has also reviewed and provided comments on the proposed ‘Electricity Bill 2000,’ which is now in its fourth revision.

IRG provided assistance and commentary to Haryana, which adopted legislation along with a timetable to restructure their SEB into separate corporate entities and to proceed with privatization of one of the distribution companies. The restructuring of the SEB into separate corporate entities, generation, transmission, and distribution, has been **completed**.

³ IRG provided assistance to the Ministry of Power – Reform Cell throughout the R-3 Project. The office staff was established and office equipment was provided to assist in staff operation. Significant training was provided to assist in the office start-up. **See Appendix 5 for a complete list of equipment provided to the Reform Cell and other organizations throughout the R-3 Project.**

Private Sector Power Generation

Expected Outcome – Adoption of Union Government of Standard Fuel Supply Agreement and Standard Power Purchase Agreement documents and the adoption of those documents as standards by at least two SEBs or other utilities; addressing IR 4.1.

Actual Outcome – Standard Fuel Supply and Power Purchase Agreements have not progressed much beyond the early drafts established in 1995. In fact, standard agreements are not complementary with the direction being established for the power sector in India. The typical agreements require dispatch at high levels for plants operating under standard agreements. This requirement for dispatch may cause lesser costs plants to be curtailed, thus increasing the cost of power. While Standard Agreements have a role in attracting entrepreneurs to India, the financial situation existing does not promote the use of these agreements without significant assurances from the Union Government. This is usually achieved through an “Implementation Agreement” that imposes severe requirements on the government if the agreements are not observed. India will be better served when they are able to competitively bid for new capacity and let the market set the prices and conditions as opposed to standardized agreements.

New plants, and existing plants, including NTPC, that sell into the national grid are required to have their tariffs approved by the Central Electricity Regulatory Commission. This commission is imposing availability and quality requirements on these generators. Generators that are involved only in intrastate operations will have their tariffs approved by the State Commission where they operate or by the SEB/State Government complex in states without regulatory commissions.

IRG worked with CERC to assist in their formation of availability tariffs that are to be applied to generators selling into the national grid. IRG also assisted UPERC in reviewing Power Purchase Agreements established between generators and distribution companies.

Expected Outcome – Adoption by the Union Government and at least two State Governments of legislation or regulation providing for the bulk sale of power by IPPs to customers other than SEBs and utilities; Addressing I 4.1.3.

Actual Outcome – Rules allowing the bulk sale of power have not been promulgated. However, “The Electricity Bill 2000,” which is being circulated for comments prior to submitting to the parliament, includes provisions for bulk sale of power and subsequent wheeling through both the national grid and state transmission and distribution systems.

Private Sector Power Transmission

Expected Outcome – Standard documents drafted and adopted by the GOI, for use by States, dealing with Licensing, Access, Wheeling Tariffs, Leases, and Implementation Agreements for private acquisition, construction, ownership, operation, and maintenance of transmission facilities, addressing IR 4.1 and I 4.1.3.

Actual Outcome – The Central Electricity Regulatory Commission has adopted technical standards for the national grid system and has approved tariffs for the grid system. “The Electricity Bill 2000,” which is planned to be submitted for parliamentary approval, will establish private ownership opportunities for the grid system, establish wheeling access to the grid and establish CERC as the regulator for these activities. A national dispatch center is planned as part of the new bill that will be responsible for collecting costs and dispatching on a least-cost, competitive basis. IRG provided assistance to CERC with grid codes and tariff calculation mechanisms. IRG also provided information and assistance applicable to the formation and operation of spot and contract electricity markets to CERC and other personnel from National Grid.

Expected Outcome – At least one large project for private investment in high voltage transmission in advanced negotiation between a private sponsor and a public sector utility as a concomitant of USAID assistance under EMCAT R-3, addressing IR 4.1 and I 4.1.3.

Actual Outcome – This activity was suspended as a result of the nuclear detonations. Following the restart of the project, it was not included in the approved activities.

Private Sector Renovation and Modernization of Plant

Expected Outcome – Development of one or more workable approaches to private sector R&M, with preparation of model procurement documents and the adoption at the Union level and by at least one State of necessary legislation and regulation for encouragement of private R&M; addressing IR 4.1 and 4.2

Actual Outcome – Plant renovation in India suffered from the same problem as establishing new plants, i.e., lack of funds and dealing with SEBs that are near bankruptcy. The private sector participants that are willing to work in India much prefer to expend their efforts and funds developing new projects as opposed to renovation projects. The Power Finance Corporation did lend funds for renovation of one plant in Haryana; however, this cannot be considered private R&M. There is significant advantage in plant renovation. Most plants operate well below their design efficiencies and the plant availability statistics are not outstanding. With well-designed renovation, plants can not only recapture their efficiency, but

can extend the plant life for ten or more years. The cost can be expected to be less than half of new power plant costs. When the financial crisis wanes, this activity will become important. This activity was not included in the restart following the nuclear detonations.

Expected Outcome – Design of formal competitive process underway or completed in at least one State for procurement for a significant quantity of additional generating capacity private sector R&M; addressing IR 4.1 and 4.2

Actual Outcome – No work was performed on this activity because of the nuclear detonations.

Financial Resources for Restructuring and Expansion

Expected Outcome – A formal report, containing a documented appraisal of private sector debt and equity resources potentially available for the restructuring and expansion of the Indian power sector, (including consideration of investment in institutional capability, generation, transmission, distribution, and R&M during the period 1998–2007, with emphasis on domestic resources; addressing IR 4.1 and 4.2

Actual Outcome – It was clearly obvious at the beginning of the R-3 project and continued throughout the project, that the central problem of the power sector in India is the inadequacy of cash flows from the sale of power. The two primary reasons for this problem are the technical and non-technical (theft) losses within the system and the imbalances in the tariff structures. At the time of project start, several schemes were being considered for financing power plant debt and equity. The scheme that attracted the most interest was the establishment of escrow accounts as payment security for IPPs. These accounts would be funded by the cash flows from the cash collection of an SEB. It soon became obvious that most SEBs were not in position to fund any escrow, and those that agreed to fund escrow accounts soon found that their cash needs from the government increased substantially. About this time, the Union Government decided that their plan to attract investments into the power generation sector had failed and that the problem was, in fact, the lack of cash flow in the system. It was decided by the GOI to pursue a path of restructuring of SEBs and to focus on improving the distributions systems. Following the nuclear detonations, international lending agencies withdrew from lending for anything other than humane reasons. This essentially dried up funds for these areas, which are only now starting to return. IRG performed two studies and published reports on each as preparatory work for determining potential debt and equity resources. The first of these reports, *Power Policy Survey and Analysis*, examined policy influence on the power sector and the second, *Power Projects Survey and Analysis*, examined power projects planned

including captive generation, clean technologies, and emerging technologies.⁴ The database established in these reports would help determine the debt and equity requirements for the power sector. This task was not included in the work after restarting the project in late summer 1998.

Expected Outcome – Development, publicizing, and conduct of three workshops/seminars and one training course on the mobilization and utilization of private investment in restructuring and expansion of the power industry, for attendance by public sector managers and by potential lenders and investors in the private sector; addressing IR 4.1 and 4.2

Actual Outcome – Two workshops were held in Chandigarh that discussed the commercial operations of unbundled corporatized entities of an SEB which included dealing with private debt and equity sources. Haryana and Punjab SEB personnel, PFC personnel, and other donors working in Haryana attended these courses. Support was provided to the finance and accounting departments at Haryana SEB and to the Distribution Companies following unbundling in dealing with private sources of debt and equity.

⁴ The chief investment in the power sector in the past few years has been in the industrial sector where captive power installations are now estimated to total 21,500 MW. In 1999, additional captive power capacity of 1700 MW was added. It is estimated that at least 35 percent of the power consumed by Indian industry comes from captive power plants. There is much agitation on the part of SEBs not to allow new captive generation to be built. Industry can self-generate for at least half the cost of power from the grid and have higher power quality at the same time. The SEBs and industrial generators should be encouraged to work together to find ways to supply power to the grid during peak load periods.

6. Recommendations

The recommendations in this section result from observations made during the R-3 Project. USAID may wish to consider these activities for future support to the power sector in India.

Integrated Resource Plan – (Least Cost Plan)

Integrated Resource Planning should be introduced in India. Rigorous plans have not been developed within any state in India, or from the center, that specifically forecast demand and identify projects, demand side or supply side, needed to serve the forecasted load. There are gross estimates of megawatts needed in the country and, in specific states, areas of deficit are identified. However, there has not been a demanding analysis to develop an “Integrated Resource Plan,” a “Least-Cost Plan,” or, indeed, even to develop a simple “Generation Expansion Plan.” The goal of planning in a utility is to integrate supply-side resources, demand-side resources, rate design strategies, and transmission and distribution system design to produce a flexible long-term resource plan that provides reliable and economical electric service to customers. The plan should look into the future for at least 15 to 20 years. These plans should be subject to intensive internal review and executive management approval. The plans are then submitted to regulatory authorities for approval where they undergo further examination and scrutiny, much of it in public hearings. Projects that survive this thorough process are more likely to receive widespread support from all entities involved in and with the power sector.

Without planning, the power sector in India appears in disorder. There is no direction, no roadmap, and no plan to follow or implement. What is the next most important power project for India or for any State in India? Is it a transmission project, an energy efficiency project, a DSM project or a Generation Project? Moreover, if the top priority is a generation project, should it be a base load, intermediate load, or a peak-load plant? In addition, is the plant to be solicited from the private sector, self-built, or should the required power be purchased through the power market on long-term contracts? What fuel or fuel source is planned for the generation project?

Since few projects have reached advanced stages, a conclusion has been reached in India that the early focus on power generation as opposed to focusing on other entities in the power sector was mistaken and that the focus should have been on distribution, where significant problems need resolution. The early focus on power generation projects was a natural reaction to shortages, i.e., install more generation and have fewer shortages. The question now being debated, generation leading reform vs. distribution leading reform, is a natural reaction to the perceived lack of success of the generation addition program. In fact, the confusion about

priorities is caused by the absence of a plan! What was the plan and goals of the generation addition program? There is no way to measure the success or lack of success of the generation program except against nebulous forecasts of demand that are largely unsupported. What is the plan to change the focus to the distribution sector? It is largely a reaction to the perceived, limited success of the program to attract IPPs, along with some recognition of the need to improve efficiencies and collections in the distribution sector. A strong argument can be developed to show that India has attracted offers of power far in excess of what is needed. How to rate and evaluate projects, how to select from and finance the projects offered, and how to negotiate and contract for the power are all problems that have essentially halted progress.

Reaction to events is often a prime mover for implementing planning, but reactions are not plans. The current effort underway in the distribution sector because of dissatisfaction with results in the generation sector has not progressed well. It is not supported by well-founded plans and will have only moderate impact on the problems in the India Power Sector.

An Integrated Resource Planning Project could be the umbrella project for the Energy Office at USAID. Current projects, ECO, IIE Training, GEP, and others all contain elements of resource planning within a utility, although none of these is conceptually tied together in a manner to support a resource-planning project. An IRP project should be developed and implemented in a “focus” state, possibly in the ECO Focus State. The project would involve the utility within a state, preferably an SEB that has unbundled its three primary units, generation, distribution, and transmission. It should focus in the distribution units but must involve the other sectors, including the regulatory commission in the state. In an unbundled power system, planning needs to be as close to the consumer as possible.

A project team should be selected to work with the selected entities. Company management will be familiarized with the concept and actual personnel assigned by management to develop the IRP will undergo two weeks of training. Computers and printers will be installed to develop the model for integrating the various planning inputs. Initially, data acquisition and input into the model will occupy much of the time. The team should encourage the participants to acquire and reduce this data and only act in an advisory capacity during this period. Early meetings with the regulatory Commission of the state to advise them of the activity should be scheduled. Interaction with other USAID Energy and Energy Efficiency Projects must be carried out on a continuous basis. Information exchange between these projects will be useful for each. The planned SARI project will benefit greatly from this work. The model developed and used in the project will require only slight modifications, if any, to accommodate cross-border considerations.

The next phase will be to actually prepare load forecasts based on economic data. Resource options both demand and supply side will be developed to meet the forecast. All options will be costed, and an integration of all options will be made using the model. This is an iterative process and includes the transmission and distributions system design changes to meet the demand, based on selected demand- or supply-side options. This iterative process takes several months to finalize, and a final plan is developed for management approval. The approved plan is submitted to the commission for review and hearings.

Development of an IRP will require 14 to 18 months. Another six months should be reserved for presentations to other states and for assisting the focus state commission to review and understand the plan.

Distribution System Efficiency

IRG has developed an analysis and training program for managers, engineers and technicians operating distributions systems, which was demonstrated and well-received in the work with Haryana (HVPN). The work in Haryana demonstrated that approximately 25 percent⁵ (which also equals 10 percent of total system output) of the losses in the distribution system switchyards are caused by technical problems created by poor maintenance practices and with poor equipment selection. These technical losses are in excess of the normal losses inherent in a well-designed and maintained switchyard. Additionally, the training demonstrated that significant equipment failures could be reduced by operational and maintenance improvements. IRG reviewed distribution system transformer failures, which were failing at a rate of 33 percent annually. This failure rate can also be attributed to poor maintenance practices and original equipment selection. Included in the training program was the acquisition and installation of Distribution System Analysis Software. This software allowed the engineers to determine the most efficient manner in which to design and operate the circuit.

USAID may consider implementing this analysis and training program in other states, possibly in the Focus State. It is recommended that, to save startup costs, the basic IRG Program be used instead of developing a new program. The course should be held at several distribution switchyards to gain maximum exposure to the engineering staff. The course will require the installation of computer and ancillary equipment, normal computer software,

⁵ The total system losses in Haryana as measured and estimated during the analysis and training work was 3993 GWH, of which 1000 GWH was technical losses. Losses above the technical losses are commercial losses mainly composed of power theft.

purchase and licensing of distribution system analysis and planning software, purchase of load logging equipment and voltage/current analyses equipment, lease or purchase of infrared analysis equipment, and other miscellaneous equipment. It is also recommended that USAID fund the purchase of sufficient equipment to correct the problems found in a representative switchyard to demonstrate the before and after conditions. The cost to correct nominal distribution switchyard problems should be minimal.

USAID may consider as part of this task, a survey of the distribution system transformer manufacture and repair infrastructure in India. Preliminary IRG work shows that manufacture and repair of transformers contributes to a significant loss of load in the distribution systems. Current repair practices allow significant increases in transformer no-load losses. A report could be produced showing the cost benefits of improving transformer manufacture and repair.

Efficiency improvements in distribution system technical losses can be very significant. For example, a 1GWH saving in energy is equivalent of 0.69 million kg of coal and savings of 0.86 million kg of carbon dioxide produced. In Haryana, correction of the technical losses would save 1000 GWh annually.

This task should be scheduled for 18 to 24 months.

Regulatory Commission Support

Electricity Regulatory Commissions in India are at a beginning and will need support to add other states to the regulatory list and to grow each commission into sustainable organizations. As regulatory commissions mature, they will become the interface between the suppliers and customers in addition to their classic roles as regulators. The interface between customers and regulators will become the most important function provided by regulators. At this interface, customers of all classes will find a voice that they never had under the SEB regimes. Many reforms in the United States, including the importance of energy efficiency, demand side management; cogeneration and renewables were and are driven by the presence of the intervenors (utility customers) before the commissions in rate hearings.

As SEBs further restructure, the regulator will have a major role in overseeing the unbundling process. Moves towards privatization will cause the regulator to become even more important, since private investment will flow to those areas where regulators have been established and operate in a predictable mode.

It is very important that USAID support for Regulatory Commissions continues. The support should continue in the following areas:

- **Support should continue in the form of USEA partnerships.** Partnerships should be encouraged to adopt more than one Indian State Electricity Regulatory Commission for a single US Regulator to allow wider access to US expertise.
- **Training should be continued.** The course offered by Teri should be upgraded and institutionalized. The course should be bifurcated to focus for the foreseeable future on commissioners and senior staff in one course and professional staff in another course. Full-time professional staff should be developed to manage the course under the auspices of Teri or others. A close association between the India program should be developed with the University of Florida so that faculty and course material may be interchanged for the respective programs. Limited international training should be allowed to continue for India Commissioners. The interfaces and experiences gained in close association with counterparts from other countries is very valuable and should be shared on return to India by requiring a presentation at the India program.
- **Support for regulatory commissions in India similar to the R-3 program should also be continued.** Start-up and initial training is still required to assist commissioners and staff in their early phases. We have seen significant professional growth in the commissions we work with and believe that similar targeted technical support will be both necessary and valuable in the future. The individual TDY visits to the regulatory commissions in India are very valuable and allow very specific training of the regulators and regulatory staff. Discussions are held that would never take place in an open forum. This support should be continued for 24 months with an option for an additional 12 months
- **Similarly, the expertise within SEBs and unbundled SEBs to develop and present cases to regulatory commissions is non-existent.** Tariff approvals under the State management of SEBs is a political process that typically ends up with inadequate attention to cost of service and causes increases in state subsidies. A major on-the-job training program needs to be conducted to assist newly created distribution, transmission, and generation companies to develop and train utility organizations to do this work. (See next section)

Regulation Training for Restructured SEBs

Establishment of SERCs and unbundling of the SEBs receives significant support from various donors. However, one area that has been left behind is the ability of the newly created utility entities to deal on a level playing field with the regulatory commissions. Much attention is given to the training of the regulatory commissions. The utility companies receive

significant support in establishing their new organizations. However, the ability of the newly created utility companies to develop and present tariff cases before the regulatory commissions is most often not covered. The only formal training presented to a new distribution company was in Haryana, which was provided by IRG as part of the R-3 project.

USAID may develop a program to assist corporatized utility entities to become proficient in developing cases to put before regulatory commissions. The support would involve organizational development, training, and installation of software and hardware, preparation of actual rate, cases and mock presentations of rate cases. Support required would involve accounting, legal, and US utility regulatory staff personnel. Support should be provided over approximately 24 months, and more than one utility can be served in parallel. Ideally, three utility units could be supported with one team.

Energy Information and Analysis

USAID has assisted in the formation of the Power Network in India under the auspices of PFC. The next step in this process is to establish important requirements for the information to be made available on this system and to expand the system to be available to any and all interested parties. Public interest requires that decision making, with respect to India's energy requirements and the sufficiency and availability of energy resources and supplies, be based on adequate, comparable, coordinated, and credible energy information. USAID should assist India to establish (perhaps within CEA) an Office of Energy Information and Analysis and a National Energy Information System. This would help assure the availability of adequate, comparable, accurate, and credible energy information to the Ministry of Power, GOI, to other government agencies responsible for energy-related policy decisions, to the parliament, and to the public. This should be installed on Power Net and Power Net opened to general access over the Web.

The US Department of Energy has established a similar network in the US, and it is widely available through the Web to all interested parties in the world⁶. This system could be used as a model. The primary assistance would be software and possibly some hardware. A small in-country team would handle most work, with TDY support as necessary. It would take about two years to establish the system and would be an excellent future task for the CEA.

⁶ The US Department of Energy, Energy Information Agency Web Site can be reached through the DOE site at www.doe.gov.

Restructuring State Electricity Boards

Restructuring activities at SEBs typically require large commitments of time and resources. The size of the USAID program with R-3, which effectively ended in late 1999, only allowed niche participation in the restructuring process. Full support to restructure an SEB would require the equivalent of ten, full-time professionals along with support personnel for about 24 to 30 months. “The Electricity Bill 2000,” when passed by parliament, will require all SEBs to separate into commercial entities, generation, transmission and distribution. Each entity will operate as a separate business, responsible for its own profit and losses and responsible for presenting separate tariff cases before the regulatory commissions. Business relationships between the various entities will be on a contractual basis. Moving from commercial entities to privatized entities will be up to each state. This unbundling will require significant assistance for each SEB. If USAID wants to participate in SEB restructuring activities, then it must allocate significant resources. Alternatively, USAID may wish to consider participation with other donors and the development banks to develop a program where each donor has specific responsibilities and works together to accomplish the task.⁷ Without either committing significant resources or working in a larger cooperative effort, there does not seem to be a role for USAID in restructuring other than responding to specific niche requests from time to time.

⁷ A similar cooperative effort was used in Eastern Europe where several donors, including the World Bank, cooperated in the power sector.

7. Conclusion

The USAID Regulatory Reform and Restructuring Project made significant contributions to the Indian Power Sector. The Union Government passed legislation to create the Central Electricity Regulatory Commission. IRG provided a critical review of the legislation and offered several recommendations. The same bill created the opportunity for individual states to create their own regulatory commission through a process of “Notification,” which greatly reduced the legislative complexity of the process. Several states used this notification process to create their SERCs and IRG assisted in the development of their “Notifications.” The Union Government also developed SEB restructuring alternatives to be used by State SEBs planning for restructuring. IRG was the primary author of the draft document adopted by the government for restructuring options. Actual restructuring of SEBs did not proceed rapidly. It has been very difficult for SEBs to give up their control. Support from donor agencies for reform was drastically curtailed after the nuclear bomb detonations by India. Two major nationwide elections also slowed the process. The last few months of the project showed renewed interest in SEB reform.

A major accomplishment of the R-3 Project was in the area of establishing Central and State Regulatory Commissions. Just reviewing the list of commissions existing today is an amazing accomplishment: CERC, OERC, APERC, GERC, HERC, KERC, MPERC, MERC, RERC, WBERC and UPERC. Only OERC existed at the start of the project. The R-3 Project directly supported the formation of several commissions and indirectly supported others. IRG provided training and technical assistance to commissions and in certain cases also provided equipment for their initial startup. The professional level of the commissions is very impressive, and US Regulators who travel to India are impressed at the level of sophistication reached in the short period of time. Continued training for both commissioners and their staffs is an essential element for continued development and success in the Indian Regulatory area.

Appendix 1: Summary of IRG Task Orders

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
1	Drafting of the Andhra Pradesh Vision 2020 Statement – Energy Component. The Chief Minister of the Government of Andhra Pradesh launched an initiative for Leadership and Excellence in the 21st Century. The CM requested support for developing the energy section of a significant component of this program, a document called "Vision 2020." This document is a statement of how the Government will meet the essential development needs of its people including Energy, in the long-term.	Sep-97	Not Approved by USAID
2	Bulk Power Tariffs, Identifying Critical Concerns and Developing a Scope of Work with CERC to detail the issues related to bulk power tariffs applicable to the sale of bulk power from NTPC and other bulk power suppliers to the SEBs and other electric power entities. IRG proposes to commence this activity with a review of critical concerns and issues associated with bulk power tariffs in India.	Sep-97	Not Approved by USAID
3	Prepare summary report for the Application of "Renewable-Friendly" Grid Codes in India	Sep-97	Not Approved by USAID
4	Restructuring and Regulatory Reform for Selected State Electricity Boards. A critical component of the <i>Regulatory Reform and Restructuring Program</i> is working with agencies of the central government, state energy departments, and State Electricity Boards (SEBs) to design and implement	Sep-97	Not Approved by USAID – However, portions of this task were later included in other Task Orders.

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
	appropriate reforms for restructuring the SEBs, as well as suitable regulatory frameworks at the state level.		
5	Assist the Ministry of Power in the Development of a White Paper on Options for Privatization of Distribution. The Ministry of Power (MOP) requested assistance in delineating the steps required for privatization of distribution franchises including an Action Plan highlighting the critical issues the Ministry needs to consider, as well as the required time to carry out the steps. The activity for this task was expanded to include support for the Coehllo Committee Work.	Sep-97/ Sep-97	This Task has been completed and a White Paper Submitted to the Ministry of Power that outlined various options for restructuring SEBs. A MOP Committee led by Mr. Coehllo (The Coehllo Committee) was formed and this Task Order supported the work of this committee.
6	Develop Regulatory Guidelines for DSM Programs. Energy supply organizations, particularly distribution companies, can play an important role in promoting energy efficiency to their customers, whether through general information campaigns or through programs designed to influence customer end-use choices and behaviors. Regulatory authorities set the policies and regulations that encourage energy supply organizations to consider DSM programs as part of their long-term planning process. IRG will work with the CERC, and several SERCs to help them understand how to encourage energy suppliers to incorporate DSM programs into their planning and business.	Sep-97	Not approved by USAID

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
7	Develop an Action Plan for the Ministry of Power for Establishment of the Central Electricity Regulatory Commission. The Ministry of Power (MOP) requested assistance in delineating the steps required for establishing and operating the Central Electricity Regulatory Commission (CERC). IRG will assist the MOP in developing an Action Plan highlighting the critical issues the Ministry needs to consider.	Sep-97/ Sep-97	After several meetings discussing the formation of CERC, the role of IRG was determined to best be used to critically review the proposed legislation establishing the Central Electricity Regulatory Commission which also included provisions allowing states to establish SERCs and provide recommendations when and where appropriate. A White Paper was submitted, and most of the recommendations made by IRG in this paper are found in the legislation that passed parliament.
8	The Ministry of Power (MOP) requested assistance in delineating model guidelines and rules for the operation of State Regulatory Commissions. In conducting this task, IRG will draw on the experiences of other countries with direct applicability to India. IRG will work with the MOP to help clarify the appropriate institutional roles of the State Regulatory Commissions (SERCs) and the Central Energy Regulatory Commission (CERC).	Sep-97	Not Approved by USAID
9	Financial Appraisal and Risk Management of Public & Private Sector Power Projects in India. The Ministry of Power and Power Finance Corporation requested a two-week course be provided by HIID.	Dec-97/ Dec-97	Task complete and final report issued.
10	India Power Project Survey and Analysis – Conduct a survey-based evaluation of the power projects under development and that	Feb –98/ Mar-98	Task Complete and Final Report issued

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
	are currently being tracked, Assess the percent of power projects relying on Clean Technologies; Evaluate current and projected status of power projects; and Forecast potential capacity additions based on Clean Technologies		
11	Survey and Analysis of India Power Policy – Conduct a survey of policy in the power sector to assess the enabling environment for the Power Sector development with respect to the following areas: Regulatory Reform; Utility System Restructuring; Private Sector Power Generation, Power Transmission, Renovation & Modernization of Plant; and Financial Resources for Restructuring.	Feb-98/ Mar-98	Task Complete and Final Report Issued
12	Reserved for HIID "one-week" course		Task Order not used.
13	Haryana State Electricity Board, Management Information Systems – The Haryana State Electricity Board (HSEB) requested assistance in evaluating the existing MIS being utilized by the HSEB and to make recommendations as to the nature of the MIS that will be required as the HSEB restructures itself. The objective of this short-term assistance is to familiarize HSEB with options available for MIS and to inform HSEB what other utilities are doing with MIS. Support beyond this first phase including implementation of MIS is proposed by DFID.	Feb - 98	Not Approved by USAID – As approval of this task was being finalized; the project was interrupted by the Glenn Amendment sanctions. After sanctions were lifted, the work of DFID had already started and this work became redundant.

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
14	<p>Haryana State Electricity Board Support for Restructuring and Developing Regulatory capacity within the Distribution Sector – Each new electric power sector entity formed in the restructuring of the Haryana power sector will require training and familiarization with the new regulatory framework that will be constituted in the process. IRG will provide training of the staffs, concentrating primarily in the distribution sector, and will develop recommendations for an organizational structure that will facilitate good working arrangements with the regulator. This regulatory assistance will be for utility personnel. The regulator personnel will be assisted by DFID and close cooperation will be necessary between the programs.</p>	Feb-98/ April-98	<p>Task completed. Developed an organizational structure for the utility tariff group and provided training to select individuals. A computer and printer were provided. A program used for determining the cost of service to various customer classes was installed on the computer and training provided. HERC rules were discussed with the utility tariff group and tariff-filing training was provided. Additionally, Utility management was familiarized with tariff and filing requirements.</p>
15	<p>Power Finance Corporation – Support for Power Sector Restructuring in Selected States – IRG will provide assistance to the Power Finance Corporation (PFC) and selected state Electricity Boards, Assam, West Bengal and Punjab in issues related to power sector restructuring. IRG will assist these SEBs in identifying the options that may be suitable for consideration and assisting with implementation of the selected structures.</p>	Feb-98	<p>Not Approved by USAID – Several revisions to this work plan were developed to address PFC and USAID concerns. however, the task was not approved.</p>
16	<p>Haryana State Electricity Board – Development of Training Plan for the Finance Department that was being established during utility restructuring</p>	Feb - 98/ Mar-98	<p>Task Completed and Final Report Issued. The actual delivery of a training plan was never finalized. Sanctions were introduced during this work and delayed the start of training. By the time further work was approved, DFID had started work in this area.</p>

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
17	<p>Ministry of Power – Cost of Independent Power Projects – The MOP requested assistance to examine the recent IPP competitive bidding experience of selected countries. Specifically, MOP requested an examination of competitive bid projects in other countries over the past two years, 1996 and 1997. The objective will be to compare these projects and to quantify the major cost features of the IPPs and identify factors that contributed to the differences in the pricing of power compared to similar projects proposed in India.</p>	Feb-98/ April-98	Work completes and report issued.
18	<p>Ministry of Power - Establish Reform Cell in Ministry - As part of the Government of India initiatives to reform the power sectors a Reform Cell was created within the Ministry of Power. The Ministry of Power requested assistance to enable this cell to become part of the V-Sat communication network being developed to link all State Electricity Boards and other various government organizations involved in the power sector. The scope of this Task is a short-term assignment to develop a comprehensive plan for the identification of the computer and communication equipment, software and training requirements to fulfill the objective. Supply of the basic hardware and required software is included in the scope. The Reform Cell will supply a suitable room or facility properly air-conditioned along with back-up power supplies and constant voltage regulation to protect the equipment prior to equipment supply.</p>	Feb-98/ April-98	Work complete and Reform Cell turned over to Ministry of Power.

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
19	Power Finance Corporation – Support for Establishment of Regulatory Regimes in Selected States – IRG will provide assistance to the Power Finance Corporation (PFC) and the State Electricity Boards of Assam, West Bengal and Punjab in identifying issues related to formation of Power Sector Regulatory entities within the states and assisting with implementation.	Feb-98	Not approved by USAID.
20	Haryana State Electricity Board - Support for Distribution System Improvements – Assistance will be provided to the Haryana Distribution entities to establish procedures for improving operational efficiency. Technical assistance will be provided to implement methods for limiting line losses and reviewing design specifications for needed improvements. Assistance will be provided to the Distribution Entities to conduct operations, as they become independent from the transmission and distribution entities. A training program will be developed to improve the quality of equipment installation and maintenance, assistance with establishing subcontractor quality assurance and control programs, materials management programs and procurement planning, improving collections, etc. Assistance will be provided to establish load forecasting and demand growth models.	April-98/ April-98	Work Complete and reports issued.
21	Haryana State Electricity Board - Support for Restructuring Workshop - The Haryana State Electricity Board requested assistance to conduct a Workshop at Panchkula with the goal of creating an understanding of the reform process by mid-level staff and	April-98/ April-98	Workshop completed.

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
	<p>encourage support for the actions being taken. Other participants involved in the restructuring process such as CIDA, DFID, World Bank and USAID will be invited to participate. They will be asked to discuss what they are doing at HSEB and the experience of their institutions in other corporatization and privatization activities.</p>		
22	<p>Punjab SEB – Support for creating a Distribution Profit Center – In cooperation with PFC, provide advice to the Government of Punjab on the restructuring and/or reorganization of the Punjab State Electricity Board and assist in the establishment of business units in all aspects of the PSEB’s operations including generation, transmission, distribution and other ancillary activities, if applicable.</p>	<p>Sep-98/ Oct-98</p>	<p>Work completed and final report issued. It should be noted that Punjab wanted and expected more than was accomplished; however, funds for this work were limited and the base work commitment was finalized. Further meetings with Punjab were offered but not accepted.</p>
23	<p>Punjab SEB – Support for privatizing a Distribution Center - The Punjab State Electricity Board requested assistance to develop plans for and implement privatization of selected distribution system(s). It will be necessary to examine the different restructuring options and reach widespread consensus with the PSEB and Government of Punjab officials early in the process. Central to most reform programs has been the introduction of IPPs. These can remain outside the SEB except for the contractual relationships that are created and the technical interfaces that need to be managed as these projects come on-line.</p>		<p>This task was prepared at the request of Punjab and the PFC as Phase 2 of Task 22 but, after discussion with USAID, was not submitted for approval pending outcome of Task 22.</p>

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
24	<p>Punjab SEB – Draft Legislation to Establish Punjab Electricity Regulatory Commission - The Government of Punjab requested assistance to draft legislation that would create the Punjab Electricity Regulatory Commission, consistent with the provisions of the Electricity Regulatory Commissions Ordinance, 1998, promulgated by the President of the Republic of India. This Task Order will provide assistance to the Government of Punjab to draft legislation that reflects the policy considerations and technical requirements necessary for the establishment of an electricity regulatory commission in the State of Punjab.</p>		<p>This task was prepared at the request of Punjab and the PFC but, after discussion with USAID, was not submitted for approval.</p>
25	<p>Support to MOP and ASCI to develop Rules, Regulations and Procedures for the Central Electric Regulatory Commission (CERC).</p>		<p>Task Order not submitted for final approval since it was later included in Task Order 27.</p>
26	<p>Government of West Bengal - The role of electricity in fostering economic growth, reducing poverty and increasing the standard of living make rural electrification a high level social objective. Establishment of Electric Cooperatives can provide significant advantages, but must be managed carefully to insure that a government's social objectives are implemented in a manner that allows the recovery of the full cost of providing electric service. West Bengal has established a Rural Electrification Development Corporation which will take over the role of rural electrification and distribution from the SEB and is interested in an assessment of the most effective means of establishing and operating the REDC as well as local cooperatives, which currently account for 30% of distribution in the state</p>	Aug- 98	<p>Not approved by USAID. Discussions were held between PFC, USAID and ADB regarding coordination of work in West Bengal. ADB decided to provide support for Rural Electrification and USAID agreed to work on creation of the Regulatory Commission. The Regulatory Commission support for West Bengal is contained in Task Order 27.</p>

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
27	<p>The newly established Central Electricity Regulatory Commission and several states have requested assistance to help establish functioning regulatory groups to fulfill their obligations under the Electricity Regulatory Commissions Act of 1998. The CERC was duly constituted per the provisions of the Act and has requested technical assistance. The States of Punjab, UP and West Bengal have requested assistance to implement the requirements of this act, establish SERCs and assist these regulatory bodies to become operational once established. Other states are planning to request assistance. The broad goals in creating these Regulatory entities are to rationalize the delivery of power, achieve electricity tariff levels which recover the real costs of delivering power to consumers, improve the financial health of the Indian power industry, improve the quality and quantity of power available to Indian consumers and to improve the efficiency of power delivery. A more efficient power industry will help clean up the environment, reduce stress on scarce resources and make a vital contribution to improving the Indian, regional and global environment</p>	<p>Sep-98/ Oct 98</p>	<p>Task Order 27 was designed to implement work during the IRG project extension from September 1999 through September 2000. It provides Training and Technical Assistance to regulatory commissions. Each instance of Technical Assistance is discussed with USAID and approved via a specific request to the COTR. Under this Task Order, assistance has been provided as follows:</p> <p>CERC – transmissions system tariff development, transmission system grid code review, incentive tariff models for generators, critique of hearings held by commission and comments on power purchase agreements;</p> <p>UPERC – organizational development and structure, review of power purchase agreements, incentive tariffs for distribution system improvement, critique of hearings held by commission, provisions for reduction of technical losses, depreciation models for utilities, accounting models for regulated utilities, staff training in utility tariff application review and supply of computer equipment for startup</p> <p>WBERC – restructuring workshops for utility, government and regulatory personnel, organizational structure recommendations, procedures and rules for commission operation and supply of computer and office equipment for startup.</p> <p>GERC – review of rate hearing process,</p>

Task Order #	Task Order Summary Description	USAID Submitted/ Approved	Status
			incentive tariff models, utility accounting models and public participation in the hearing process.
			General – Sponsored 10 students at the first local class for regulators based on the World Bank Florida State University model and provided an instructor for part of the course.

Appendix 2: Summary of IRG Training Activities

S No.	Program Title	Field of Study	Date	Training Type	No. of Participants
1	Investment Appraisal and Risk Analysis for the power sector at NIFM, Faridabad	Financial	05 Jan.-23 Jan'98	Course	35
2.	Understanding the Restructuring Process at Panchkula, Haryana	Utility Restructuring	17 May '98	Seminar	61
3.	Problems and Solutions on Distribution of Power at PFC	Distribution System- Technical Efficiency	22 July '98	Seminar	20
4.	Problems and Solutions on Distribution of Power at Taj Palace	Distribution System- Technical Efficiency	23 July '98	Seminar	32
5.	Michigan State University NARUC Regulatory Studies Course, Michigan	Regulatory Management	August 02 –14 '98	Course	05
6.	Problems and Solutions on Distribution of Power at HVPN	Distribution System – Technical Efficiency	Sept. 04 '98	Workshop	20
7.	System Efficiency Improvement Training Project at Panchkula	Distribution System – Technical Efficiency	Sept. 24, 25, 28, 29 '98	Classroom and On-the-job-training	14

S No.	Program Title	Field of Study	Date	Training Type	No. of Participants
8.	System Efficiency Improvement Training Project at Panchkula	Distribution System – Technical Efficiency	26 Oct.-06 Nov. '98	Classroom and On-the-job-training	14
9.	System Efficiency Improvement Training Project at Karnal (Two one-week Classes)	Distribution System – Technical Efficiency	09 –27 Nov. '99	Classroom and On-the-job-training	35
10	System Efficiency Improvement Training Project at Hissar (Two one-week classes)	Distribution System – Technical Efficiency	30 Nov. –18 Dec. '98	Classroom and On-the-job-training	20
11.	Consumer Role in Power Sector Reforms held at CME, Hyderabad	Utility Regulation	28-30 Dec.'98	Seminar	20
12.	Regulation of Electric Utilities at Calcutta	Utility Regulation	Jan. 09	Workshop	17
13.	Regulation of Electric Utilities at Calcutta	Utility Regulation	Jan 13	Workshop	34
14	Approaches to Commercial Operations at Chandigarh for PSEB	Financial	Jan. 18	Workshop	32
15	Approaches to Commercial Operations at Chandigarh for PSEB	Financial	Jan. 19	Workshop	53
16	Fifth International Training Program on Utility Regulation & Strategy, Gainesville, Florida	Utility Regulation	Jan. 10-22 '99	Course	02

S No.	Program Title	Field of Study	Date	Training Type	No. of Participants
17	Presentation on "System Efficiency" at Vadodara, Gujarat	Distribution System-technical Efficiency	03 Feb. '99	Seminar	19
18	National Conference on "Transition to a Liberalised environment: experiences & issues in regulation"	Utility Restructuring and Regulation	03-04 Feb. '99	Seminar	35
19	Presentation on "System Efficiency" at Mumbai, Maharashtra	Distribution System-technical Efficiency	06 Feb. '99	Seminar	16
20	Presentation on "Emerging Regulatory Framework for the Power Sector" at PMI	Regulation & Restructuring	19 Feb. '99	Course	25
21	Presentation on "Rate Case Modelling" at HVPN	Cost of Service Computer Model Training	22Feb. -01 March '99	Course	05
22	Presentation on "Tariff Setting" at HVPN	Cost of Service Computer Model Training	27 Feb.-05 March	Course	04
23	Sixth International Training Program on Utility Regulation and Strategy at Florida during	Utility Regulation	June 14-25, 1999	Course	03
24	HVPNL-Distribution System Analysis & Planning Software Training	Computer/ Technical skills- Distribution Circuit Analysis	June 28-July 7	Classroom and Computer Training	04

S No.	Program Title	Field of Study	Date	Training Type	No. of Participants
25	Michigan State University NARUC Regulatory Studies Course, Michigan	Utility Regulation	01-13 Aug.'99	Course	04
26	Powertech India - ADB Conference, Mumbai	Regulation	11-13 Oct. 99	Seminar	40
27	IPPAI Conference on "SEB Reforms" Chennai	Utility Restructuring	14 Oct. 99	Seminar	40
28	EETP Implementation of Power Sector Reforms & Utility Regulation; Portland ME	Regulation	11 Oct 5 Nov 99	Course Note: Course Sponsored by USAID Global Bureau and conducted by IIE. IRG selected participants	06
29	EETP Economic and Financial Evaluation of Renewable Energy Projects; Wash. DC	Project Cost Analysis	18 Oct 12 Nov 99	Course Note: Course Sponsored by USAID Global Bureau and conducted by IIE. IRG selected participants.	01
30	Least Cost Planning for Electric Utilities; Boston MA	Utility Long Range Planning	22 Nov 17 Dec 99	Course Note: Course Sponsored by USAID Global Bureau and conducted by IIE. IRG selected participants	03
31	ASSOCHAM Conference on Unresolved Issues, Delhi	Utility Restructuring	28 th Oct. 99	Seminar	40

S No.	Program Title	Field of Study	Date	Training Type	No. of Participants
32	South Asia Forum on Infrastructure Regulation (SAFIR) Core Training Course on Infrastructure Regulation and Reform Agra	Utility Regulation	13-17 Feb'00	Course	IRG Sponsored 10 Participants and provided an instructor

Appendix 3: Summary of training provided under the R-3 Project to Regulators and other government officials.

S. No.	COURSE	DURATION	REGULATORS SPONSORED
1.	Michigan State University NARUC Regulatory Studies Course, East Lansing	August 2-14, 1998	<p>1.Mr. Shital Kumar Jena, Director (Tariff), Orissa Electricity Regulatory Commission</p> <p>2. Mr. Vijay Kharbanda, Senior Manager (Institutional Appraisal Development), Power Finance Corporation</p> <p>3. Mr. Anil Kumar Gupta, Director, Central Electricity Authority</p> <p>4.Mr. P. C. Dewan, Chief Engineer, Haryana Vidyut Prasaran Limited</p> <p>5. Mr. Subba Rao Gunupudi, Principal Secretary, Govt. of Gujarat, Energy and Petrochemicals Department</p>
2.	Fifth International Training Program on Utility Regulation and Strategy, Gainesville Florida	January 11-22, 1999	<p>1.Mr. A. R. Ramanathan, Member (Law), Central Electricity Regulatory Commission</p> <p>2. Mr. Rajiv Dutt, Director (Finance), Ministry of Power</p>
3.	Sixth International Training Program on Utility Regulation and Strategy, Gainesville, Florida	June 14-25, 1999	<p>1.Mr. Subba Reddy, OSD to Minister of Power, New Delhi</p> <p>2. Mr. Ramesh Chander, Member, Haryana Electricity Regulatory Commission</p> <p>3. Mr. S. S. Ahluwalia, Secretary, Central Electricity Regulatory Commission</p>
4.	Michigan State University NARUC Regulatory Studies Course, East Lansing	August 01-13, 1999	<p>1. Mr. J. L. Bajaj, Chairman, Uttar Pradesh Electricity Regulatory Commission</p> <p>2. Mr. V. S. Ailawadi, Chairman, Haryana, Electricity Regulatory Commission</p> <p>3. Mr. G. P. Rao, Chairman, Andhra Pradesh Electricity Commission</p> <p>4. Mr. Baleshwar Rai, Joint Secretary, Ministry of Power</p>
5.	EETP Training Program on	Oct.11-Nov. 5, 1999	<p>1. Mr. G. S. Rajamani, Member, Central Electricity Regulatory Commission</p>

S. No.	COURSE	DURATION	REGULATORS SPONSORED
	"Implementation of Power Sector Reforms", Portland, ME, USA		<p>2. Mr. Rajeev Sharma, Deputy Secretary, Ministry of Power</p> <p>3. Mr. G. S. Ghai, Manager, Power Finance Corporation</p> <p>4. Mr. Lakshminarayana, Member, Andhra Pradesh Electricity Regulation</p> <p>5. Mr. A. V. Subba Rao, Member, Andhra Pradesh Electricity Regulatory Commission</p> <p>6. Mr. S. C. Dhingra, Member, Uttar Pradesh Electricity Regulatory Commission</p>
6.	EETP's Training Program on "Economic & Financial Evaluation of Renewable Energy Projects", Washington, DC	Oct. 18-12 Nov. 1999	1. M. P. D. Gaikwad, Chief, Rural Electrification Corporation
7.	EETP's Training Program on "Least Cost Planning for Electric Utilities", Boston	Nov. 22-17 Dec. 1999	<p>1. Mr. S. N. Burman, Deputy Secretary, Ministry of Power</p> <p>2. Mr. Vijoy Kumar, secretary, Central Electricity Authority</p> <p>3. Mr. Sanjeev Garg, Senior Manager, Power Finance Corporation</p>
8.	Core Training Course on "Infrastructure Regulatory & Reform" organised by TERI, Agra, India	February 07-18 2000	<p>1. Mr. Anand Kumar, Senior Specialist (Finance), Uttar Pradesh electricity Regulatory Commission</p> <p>2. Mr. Sanjay Varma, Joint Director, Haryana Electricity Regulatory Commission</p> <p>3. Mr. A. Bishoi, Manager (Commercial), NTPC</p> <p>4. Mr. M. Ramakrishna Rao, Senior Manager (Law), NTPC</p> <p>5. Mr. Suresh Sachdev, General Manager (Commercial), Power Grid Corporation</p> <p>6. Mr. Akhil Kumar, Deputy General Manager (IPTC), Power Grid Corporation</p> <p>7. Mr. S. Venkata Narayana, Director (Administration), Andhra Pradesh Electricity Regulatory Commission</p> <p>8. Mr. P. Solomon Herme, Dy. Director (Planning & Power Procurement, Andhra Pradesh Electricity Commission</p> <p>9. Mr. N. Nagraj, Dy. Director (law), Andhra Pradesh Electricity Regulatory Commission</p>

S. No.	COURSE	DURATION	REGULATORS SPONSORED
			10. Mr. V. P. Shah, SE (EDP), Gujarat Electricity Board

Appendix 4: Primary contacts at SEBs, Regulatory Commissions and others during R-3 Project

CERC Core 3, V Floor NTPC Bhavan Scope Complex Lodhi Road, New Delhi 3			
NAME	DESIGNATION	TELEPHONE	FAX
Mr. S.L Rao	Chairman	4360004	4365082
Mr. Ramanathan	Member (law)	4361280	
Mr. D. P. Sinha	Member (Engineering)	4361259	
Mr. G. S. Rajamani	Member (Finance)	4361235	
Mr. S. S. Ahluwalia	Secretary	436 1051	
MINISTRY OF POWER Shram Shakti Bhavan Rafi Marg New Delhi 110001			
Mr. Jiji Thomson	Director (R&R Cell)		
POWER FINANCE CORPORATION 3 rd Floor, Chandralok Building Janpath New Delhi 110001			
NAME	DESIGNATION	TELEPHONE	FAX
Mr. Uddesh Kohli	Chairman /Managing Director	3315 824	3721118
Mr. A.A.Khan,	Director	3356157	3717308
Mr. V.S. Saxena	General Manager, PPT	3755109	3722301
Mr. Ray	Manager Training	3721116	
Mr. R. Krishnamoorthy	General Manager(IADP)	3721105(Dir.)	
		331 5822	
		3755112	
		3721107	
		3722301-08	

Haryana (0172) Govt. of Haryana Secretariat Sector-3 Haryana			
NAME	DESIGNATION	TELEPHONE	FAX
Mr. S. Y. Quraishi (now replaced)	Secretary, Energy, Govt. of Haryana	540128	745279
Mr. L. M. Jain	Financial Commissioner, Power & Chairman, HPGCL		
Haryana Vidyut Prasaran Limited Shakti Bhavan, Sector 6 Panchkula-134 109			
Mr. Ranjit Issar	Ex-Chairman (now replaced)	560579	560087
Mr. Y. S. Malik	Present Chairman	566330	560087
Mr. R.K. Jain	Chief Engineering/Planning	561935	565746
Mr. P.K. Verma	Director Operations	560564	566685

Haryana Electricity Regulatory Commission (0172) SCO # 180 Sector –5 Panchkula Haryana			
NAME	DESIGNATION	TELEPHONE	FAX
Mr. Ailawadi	Chairman	572997	572359
Mr. Ramesh Chandra	Member	582598	582532
Mr. P.K.Das	Secretary	82531	
Uttar Pradesh (0522) Govt. of Uttar Pradesh 12th Floor, Shakti Bhawan Ext. 14- Ashok Marg, Lucknow UP. 226001			
NAME	DESIGNATION	TELEPHONE	FAX
Mohd. Iftikharuddin	Special Secretary(Energy)	237 270	238757
Mr. Atul Chaturvedi I.A.S	Secretary (Energy)	238068	237113
Mr. Jamal Masood	Consultant,	280239 (Telefax)	
Mr. R. P. Dubey	Reform Project Management Organisation (RPMO) Director General, RPMO	280234	
UPSEB Shakti Bhavan 14 Ashok Marg Lucknow			
Mr. G.P. Singh	Chairman	226736	211169

UPERC 2 nd Floor Mandi Bhavan Gomti Nagar Lucknow-2260 10			
NAME	DESIGNATION	TELEPHONE	FAX
Mr. R.P. Singh(now replaced)	Ex-Secretary	300354	300292
Mr. Anup Wadhawan	Secretary		
Mr. J. L. Bajaj	Chairman	300287	
Mr. A Sarkar	Member	300225	
Mr. S.C. Dhingra	Member	300320	
Punjab (0172) Govt. of Punjab Mini Secretariat Sector-9 3 rd Floor Room No 310 Chandigarh, Punjab			
NAME	DESIGNATION	TELEPHONE	FAX
Mr. Bikramjit Singh	Principal. Secy. Power	741285 743545 741927	742 911
PSEB (0175) The Mall, Patiala 147 001 Near Phuwara Chowk			
Mr. Tuteja	Chairman	212005	213199
Mrs. Ajanta Dayalan	Member Finance	212053 (Telefax)	21589
Mr. S. C.Arora	Chief-Cost, Control & Reduction	213 045	
Mr. S.P.S Sahi	Director/Planning And Chief Engineer Planning	213032	

APERC (040) 8-2-283/B/1 Road No. 3 Banjara Hills Hyderabad 500 034			
NAME	DESIGNATION	TELEPHONE	FAX
Mr. G.P. Rao	Chairman	3542519	3542036
Mr. A. V. Subba Rao	Member	3542521	
Mr. D. P. Laxminarayana	Member		
Mr. T. B. Narsimarao	Secretary		
WBERC (033) Flat # 2 & 3, Block 5 L A Block, Bidhan Nagar, Sector I Cal. 700 091			
NAME	DESIGNATION	TELEPHONE	FAX
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Justice Saroj Kumar Faujdar	Chairman	3357167 (Telefax)	
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Mr. A. K. Jain	Member, Finance		
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Appendix 5: Commodities Transferred

<u>List of commodities transferred to WBERC, Calcutta.</u>				
S. No.	Product	Unit	Serial Number	
1	HP BRIO (BA 400) Celeron 433 MHZ/64 MB Non ECC SD RAM/4.3 GB HDD/1.44 FDD/10/100 MBPS Ethernet Card/15" Color monitor/Mouse/104 Keys Keyboard/48x CDROM/Sound Card/Win'98	4	CPU SG94374678 SG94374809 SG94374543 SG94374677	MONITOR CN94022201 CN94682791 CN94019531 CN94019547
2	PRINTER HP LaserJet 4050N	1	SG70049171	
3	SOFTWARE MS Office 2000 Prof.	4	W000283604229 W000283601030 W000283601031 W000283601032	
4	UPS APC UPS 500 VA (with Auto Voltage Regulator)	4	BB9946005418 BB9946005570 BB9946005155 BB9946005059	
5	CATS Cable	As per actuals		
6	RJ45 Connector	10		
7	HUB	1	DE809TC	

	D-Link HUB 8 Port(10/100 MBPS)		
8	Modem US ROBOTICS 55.6 KBPS	1	2380BBN9T42B
9	Internet Station/Internet Router	1	HGK29C000472
10	Panasonic Fax Machine UF 333 (Plain Paper Fax)	1	005991005765
11	Canon Automatic Plain Paper Copier inclusive of Excise duties where applicable Model No. NP 6130 Starter/Toner Accessories: a) ADF b) Sorter c) 2 KVA Servo	1	
12	Trolley		

ITEMS TRANSFERRED TO WBERC FROM THE SURPLUS:			
S. No	PRODUCT	UNIT	SERIAL NUMBER
1	DP 2000 5166 MMX 1.2 GB HardDisk/ 1.44 FFD Ethernet Card/Mouse/104 Keys Keyboard/Win 98 Preinstalled	02	7733HVU52175 7729HVU51878
2	14" Colour Philips Monitor 14B 1320W/97H	01	14B 1320W/97M
3	15" Philips Colour Monitor 15C 3220W	01	15C 3220W/97D
4	HP 890C Inkjet Printer	01	SG 7BSI6026

List of commodities transferred to UPERC			
S. No	PRODUCT	UNIT	SERIAL NUMBER
1	HP BRIO COMPUTER INTEL Celeron 400 MHZ CPU, 32 + 32 MB RAM, 4.3 GB Hard Disk 1.44 MB Floppy drive, Integrated Audio Drive, HP Color Monitor, 32 CD Rom AGP with 4 MB VRAM, Keyboard, Mouse, HP Brio center and Diagnostic Tools, Windows 98 and McAfee Preloaded 10 MBPS Network Card (COMPEX)	3	COMPUTERS SG 91974518 SG 91974446 SG 91972448 MONITOR KR 91995245/6932/66433
2	PRINTER HP Laser JET 4050N (Network capable)	1	SG 7T053955
3	MODEM US Robotics 56 KBPS External modem	1	455668-01
4	UPS APC 500 VA UPS	3	PB9920220819 PB9919124537 PB9919124331
5	HUB D Link 8 Port 10 MBPS Hub	1	99H008255
6	Software MS Office Professional 2000(CD Media)	3	
7	IBM Laptop Computer Model No 1412	1	387 2B 567
8	IBM 32 MB SD RAM NP 3.3 V For IBM Think Pad	1	76 H0 294
9	10/100 Ether. Adap, Single Pack	1	08 L3147
10	Brief case for the Laptop		

List of items transferred to UPERC from the surplus:

S. No.	Product	Unit	Serial Number
1.	DP 2000 5166 MMX 2.1 GB Hard Disk/1.44 FFD Ethernet Card /Mouse/104 Keys Keyboard/Win 98 Preinstalled	01	7740BK521201
2.	14" LG-440SI Color Monitor	01	901DI00458

List of items transferred to MOP:

S. No.	Product	Unit	Serial Number
1	Window air conditioners	2	O198000091
2	Panasonic Fax machine	1	
3	Shredder	1	
4	ModiXerox Copier	1	2903083721
5	Computer hardware & software	1	
6	Server, Compaq Proliant, PII-350		PL400635051264.3A /P7910CJS20089
7	Compaq Deskpro PC's,Celeron300A	6	See note 1
8	PC, ACER PII 233Mhz with UPS	1	
9	color printer, HP DJ 890C	1	
10	Laser Printer, HP Laser Jet1100	1	
11	Scanner,HP Scan Jet 6250C	1	
12	DAT Drive, HP Surestore C1559	1	
13	Win'98	7	
14	MS Office 97	1	N.A

15	Mcafee Anti Virus	1	N.A
16	IBM Think Pad & accessories	1	N.A
17	Furniture(storage closet & round conf. Table)		
18	Zyxel U 33 6E Modem 3 paintings		N.A

Notes:

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1: 7847CCR21659, 7847CCR21446,
7847CCR21558,7847CCR21882,7847CCR21371,7847CCR1659

<u>List of commodities transferred to HVPNL</u>			
S. No.	Product	UNIT	Serial Number
1.	Compaq Deskpro 2000(166Hz) 2.1GB Hard Drive,32 MB RAM with Philips 14 inch color monitor101 Key Board and Mouse		7729 HVU 51454.
2.	HP Inkjet Portable Printer		
3.	*Stoner software		
4.	Halo TM Ammeters, Model 9390		2H0998207 2H0998208
5.	Extension Rods (AKA hotsticks), Model S235		

*The original software that was purchased for HVPN was called DPA/G 5.1 and the upgrade that has been provided now is called Synergie 3.1.

Appendix 6: References

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