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MOVING MARKETS FOR ENERGY EFFICIENCY

COUNTRY WORKING PAPER: MEXICO

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I. Rationale for Country Selection

The Moving Markets for Energy Efficiency (MMEE) project has selected Mexico as a key country for demonstrating application of its framework and tools for stimulating the delivery of energy efficiency services, based on Mexico's history of energy efficiency activities, its importance as an emitter of greenhouse gases, and its commitment to developing sustainable markets for energy efficiency services.

Mexico is a key country in demonstrating the establishment of sustainable markets for energy efficiency services. Mexico is one of the world's top greenhouse gas emitters and has increasingly been directing its efforts toward countering high levels of pollution and greenhouse gas emissions, with a focus on energy efficiency as one of the key elements in its national strategy.

USAID has actively supported sustainable energy development and use in Mexico, promoting and providing technical assistance to activities that have prevented the emission of 16,500 metric tons of CO₂ through 1997.¹ The proposed USAID budget for FY 1999 includes \$5.58 million to support activities in Strategic Objective No. 2, which seeks to reduce greenhouse gas emissions from wasteful energy use, pollution, and deforestation, and to increase conservation and sustainable use of natural resources in priority natural areas. The Mexico energy efficiency program has strengthened Mexican energy sector institutions, among them the National Commission for Energy Savings (or CONAE – Comision Nacional Para el Ahorro de Energia) and the Trust Fund for Support of the Energy Savings Program of CFE (or FIDE – Fidecomiso para el Ahorro de Energia Electrica), leading to the design and implementation of a five-year national incentives program and elevating Mexico to position of regional leadership in energy efficiency.

II. Country Economic Profile

Mexico has a free market economy with a mixture of modern and outdated industry and agriculture, increasingly dominated by the private sector. The number of state owned enterprises in Mexico has fallen from more than 1,000 in 1982 to fewer than 200 in 1998. The present administration is privatizing and expanding competition in sea ports, railroads, telecommunications, electricity, natural gas distribution, and airports. Mexico's economy is in the upper-middle-income group, at an estimated \$4,309 GDP/capita for 1997.²

¹ USAID Congressional Presentation. US Fiscal Year 1999.

² WEFA Economic Outlook for First Quarter 1999. WEFA website. 1999. WEFA statistics estimate GDP at market exchange rates. Purchasing power parity estimates for 1997 put Mexico's economy at \$7,700 GDP/capita.

The Mexican economy is in its third year of recovery from the recession of 1995, which was sparked by a financial crisis. After declining 6.2% in 1995, real GDP grew 5.1% in 1996 and 7.3% in 1997, and is expected to grow 5% in 1998. Mexico's strong export sector, headed by the *maquiladoras* and the oil industry, helped to cushion the economy's decline in 1995 and led the recovery in 1996 and 1997. The United States is Mexico's largest trading partner by a wide margin, representing an 85% share of Mexico's exports and a 75% share of Mexico's imports. Accordingly, the strength of the US economy has caused beneficial spillover effects in Mexico, notably through exports of goods and services and unilateral transfers in the form of family remittances from Mexicans living in the US. Mexico's 1997 export revenues include a 41% contribution from the *maquiladoras* and 10% from oil.

The economic outlook for the near future is positive. Government and private sector economists are projecting average annual GDP growth of 4% to 5% through the year 2000. Increased employment and rising real wages are expected to result in an increase of at least 4% in private consumption in 1998, and the banking sector is likely to increase lending for the first time in three years. The Mexican financial system, however, remains weak as the banking industry continues its restructuring and downsizing. Interest rates will remain high while the central bank continues its effort to control inflation and the continued peso depreciation. Table 1 presents key economic indicators for the next several years, illustrating the positive outlook for growth and the balancing weaknesses in inflation and currency depreciation.

Selected Indicators	1998	2000	2002	2004
Real GDP (% change)	4.8	4.6	4.9	5.3
Year-end CPI (% change)	18.0	13.3	10.7	9.6
Budget deficit (% GDP)	3.9	3.6	3.2	2.3
Year-end exchange rate (Pesos/US\$)	10.2	12.6	14.9	16.9

Table 1: Selected Economic Indicators 1998—2004
Source: WEFA, 1998

III. Description of Energy Sector

The Mexican energy sector is a powerful contributor to the national economy. In 1997, the energy sector generated 3.2% of the country's GDP (2.4% from petroleum and natural gas products, and 0.8% from electricity), represented a 10.8% share of total exports, produced one-third of total public revenues, and contributed 56.4% of total public sector investment.

The energy supply sector is primarily state owned, with private sector participation limited to transportation, storage, and distribution of natural gas, and to a growing share of generation in the power sector. Figure 1 illustrates the organization of key public sector agencies in energy supply.

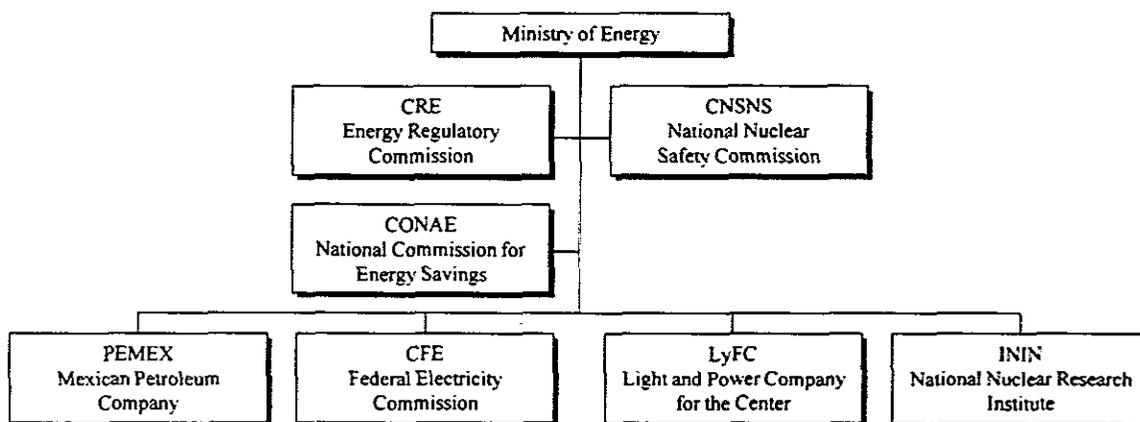


Figure 1: Mexican Energy Sector Organization

PEMEX, the Mexican Petroleum Company, is responsible for exploration, production, and wholesale transactions of petroleum products and natural gas. Mexico ranks fifth globally in oil production and fourteenth in natural gas reserves. The large gas reserves have prompted the government to restructure retail distribution in the country and expand domestic use of natural gas. By late 1998, fourteen permits had been granted to the private sector for construction, operation, and ownership of natural gas distribution. In the ten-year period from 1998 to 2008, natural gas use in power production is expected to rise from 20% to 40% of total gas consumption in Mexico. In the same period, the residential and commercial share of natural gas consumption is expected to rise from 3% to 7%.³

CFE, the Federal Electricity Commission, has a near monopoly over the production and distribution of electricity, though reforms are introducing competition for new generation to attract investment from the private sector. Installed generation capacity is presently 34,815 MW; new capacity additions are expected to total an additional 13,000 MW of generation capacity by 2007 to serve average annual demand growth of 6%. In the expansion plan through the year 2007, private projects are expected to grow at 9% annually.

Legislation in 1993 created four basic categories for private power generation:

- Generation for self-supply, cogeneration, or small (under 30 MW) production, with limitations for sale only to small communities, rural areas, or CFE
- Generation by independent producers for sale to CFE under long-term contracts
- Generation for export under renewable, 30-year licenses
- Importation for self-use and emergency power generation

From 1994 to early 1998, 103 private generation permits were granted for a total of 4,552 MW, or 13% of national capacity. Nearly three-fourths of the generation capacity in private power projects is fired from natural gas.

³ From statistics on the website of Mexico's Ministry of Energy, 1999.

Key public sector agencies active in energy efficiency include the National Commission for Energy Savings (CONAE) and the Trust Fund for Support of the Energy Savings Program of CFE (FIDE). CONAE reports directly to the Ministry of Energy, and has responsibility for:

- Conceiving strategies and coordinating actions to promote the more rational use of energy
- Establishing equipment and building standards for energy efficiency
- Providing technical assistance and information regarding energy-efficient and renewable energy technologies
- Preparing, conducting, and evaluating national campaigns to promote energy efficiency

FIDE reports functionally to CFE and its program activities in support of energy efficiency are correspondingly restricted to the efficiency in the use of electricity. In spite of the relatively narrow scope of FIDE's activities, the organization is well-funded and implements large national campaigns. CONAE and FIDE coordinate national activities closely. Their current and planned activities are describe more fully in sections that follow below.

Markets for energy efficiency in Mexico include significant potential for cogeneration, end-use efficiency technologies (e.g., motors, lighting, air conditioning, etc.), and energy services such as audits, engineering, and contracting. CONAE has estimated cogeneration potential in industry to be as much as 20,500 MW, of which the petrochemicals industries represent the largest share (29.5%), followed by PEMEX facilities (20.5%), pulp and paper industries (14.6%), food processing (10.9%), sugar (10.3%), metals (9.4%), and other. Estimates for 1996 put the markets for efficiency services at:⁴

- Cogeneration: US\$ 360.0 million
- High-efficiency technologies: US\$ 17.5 million
- Energy services: US\$ 3.8 million

IV. Energy Efficiency Market Barriers and Market Drivers

Markets for energy efficiency in Mexico are emerging rapidly, due in large part to promotional campaigns and programs sponsored by the Government of Mexico, and supported by funding from the international donor community. The markets are immature, however, and the more widespread adoption of efficient goods and services faces many barriers. Among the more significant barriers are:

- Macro-economic conditions, including domestic interest rates exceeding 25% for commercial lending, a weak financial system in general, and political uncertainty regarding the outcome of the next elections

⁴ From *Mexico's Environmental Markets*. USAID Business Focus Series. USAID. March 1995.

- Lack of supporting regulations (e.g., grid access, sale to third parties, net metering, fuel supply guarantees, etc.) for development of cogeneration projects
- Limited experience in the financial sector with non-recourse project financing and alternative lending arrangements
- Absence of codes for energy efficiency in equipment and buildings
- Cross-subsidies in energy pricing, particularly in electricity
- Low awareness of energy-efficiency technologies and benefits in most energy end-user market segments
- Low awareness and credibility of energy service providers and performance contracting methods
- Limited availability of energy-efficient goods and services
- High costs of energy-efficient technologies, particularly imported equipment

Market drivers for energy efficiency goods and services include a significant amount of spillover from the attention attracted to the energy sector's broad requirements for investment capital. The need for rapid expansion of energy supply, in both natural gas and electricity supply, has caused PEMEX and CFE to seek private sector investment and to focus more closely on restructuring imperatives to ensure more efficient capital allocation and system operations, as well as supply alternatives (e.g., energy-efficiency and renewable energy) to satisfy the country's energy demands. In the particular markets for energy-efficiency, market drivers include:

- Expansion of private sector industry, particularly in the *maquiladoras* established in the Northern regions to capitalize on the North America Free Trade Agreement (NAFTA)
- Continued expansion of the tourism industry, which has tended to operate in foreign currency-denominated enclaves and is therefore somewhat isolated from domestic interest rates and inflation pressures
- Continuing privatization and deregulation of industry
- Development of domestic natural gas resources and distribution, enabling greater efficiencies in power supply and in industrial application
- Continued efforts to rationalize energy pricing to remove subsidies and cross-subsidies

V. Past and Current Energy Efficiency Activities

Historical and ongoing public sector programs in energy efficiency have been designed to address key market barriers, primarily first-cost barriers and awareness and information gaps. CONAE and FIDE have been the lead institutions in implementing public sector programs, and both have been active in energy efficiency since the institutions were established – in both cases, about ten years ago.

CONAE has provided leadership in formulating and directing national studies on energy efficiency, establishing policy directives, and conducting educational, training, and public

awareness campaigns. In the course of conducting studies, CONAE has conducted numerous audits and boiler tune-ups, but has not had the objective of developing into a center for provision of services. Instead, its aims are to provide assistance to:

- policy makers (through studies and investigations);
- private service providers (through educational programs, learning tools, technical assistance, and demonstration);
- public sector energy consumers (through audits, management capacity building, and awareness campaigns); and
- private sector energy consumers (through awareness campaigns, information dissemination, technical assistance, and analytical tools).

CONAE is organized as a small central institution, with much of its outreach conducted through a network of 15 regional centers, the Unidades de Enlace para la Eficiencia Energética (U3E), which maintain technical assistance centers through cooperation with universities, municipalities, and industrial associations. The U3E centers coordinate training and education programs, provide information and resource tools, and collaborate with local industrial enterprises and government organizations. CONAE's present activities include technical assistance and information services that are provided through CONAE, U3E centers, and website tools to help energy users (or service providers) develop energy-efficiency applications. Figure 2 illustrates the CONAE strategy.

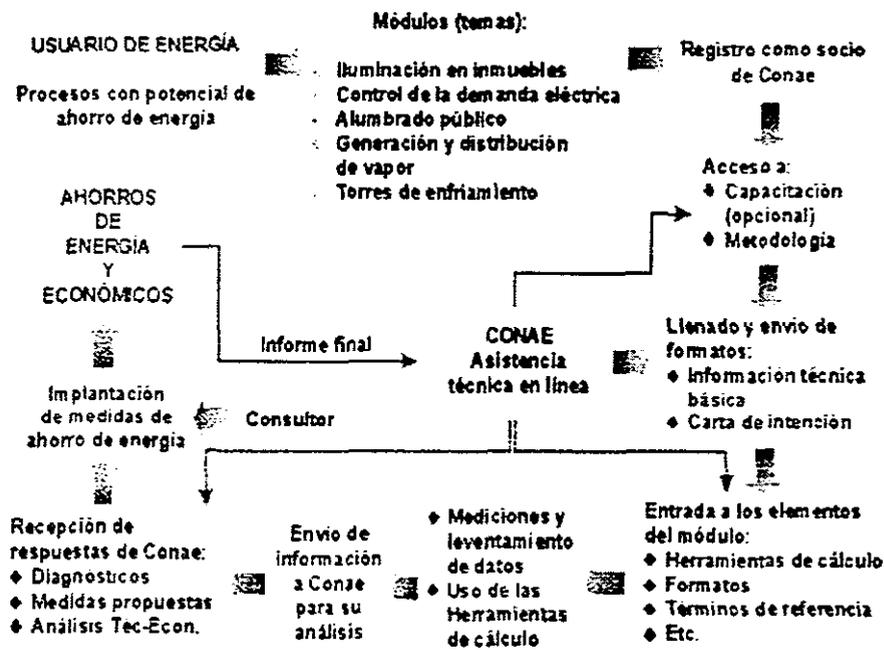


Figure 2: Strategy for Technical Assistance through "Virtual CONAE"

CONAE also directs international technical exchange programs; develops national energy-efficiency standards and labeling programs for equipment; conducts pilot and demonstration programs for municipal lighting and air conditioning; coordinates technical programs for cogeneration, industrial steam systems, and renewable energy; provides guidance to energy sector and energy-efficient transportation policy development; coordinates energy sector activities with national environmental strategies;

maintains energy information systems; and directs regional activities in disseminating energy efficiency information.

FIDE, the other major public sector institution active in energy efficiency, is more directly involved in implementation activities. Beginning with implementation of energy audits in the early 1990s, FIDE is now focused on long-term development of energy efficiency markets. In 1994, FIDE launched the Ilumex project to promote compact fluorescent lamps (CFLs) in residential applications in Monterrey and Guadalajara. With the support of GEF, CFE, and Norwegian funding, the Ilumex project disseminated approximately 2.5 million CFLs in over 500,000 homes. FIDE arranged for wholesale purchase of CFLs in the Ilumex project and distributed the lamps through CFE district offices. Residential customers repaid the cost of CFLs in four payments over an eight-month period. CFE considers the program highly successful, and is funding a follow on project of similar design that has goals of providing 6 million CFLs to homes and small businesses nationally.

In addition to the Ilumex activities, FIDE has been promoting energy-efficient street lighting to municipalities, and has presented more than 100 workshops for energy end-users and training programs for energy service providers. FIDE also collaborates with CONAE and the Electric Research Institute (IIE) on the development of energy efficiency standards for appliances and other electric end-use equipment.

In a major new initiative, FIDE is the lead implementing agency in a \$46 million, five-year project funded in part by a \$23 million loan from the Inter-American Development Bank. The project has four main elements, which will target energy efficiency in broad market segments with the following strategies:

- Rebates and incentives to stimulate demand for high efficiency motors, T-8 lighting systems, and air compressors. The program design calls for reducing the level of financial subsidy over time as markets begin to transform through higher levels of end-user demand.
- Alternative financing schemes to make project development funds and project financing capital more readily available to both end-users and energy service companies.
- Development of markets for energy efficiency services to the industrial sector, with support for capacity building in service companies.
- Information dissemination, including promotion of labeling programs for high-efficiency products.

USAID has been highly active in supporting Mexico's energy efficiency activities through components of its environment program for Environmentally Sound Natural Resource and Energy Use. Within the environmental program, the energy efficiency program has strengthened Mexican energy sector institutions (particularly FIDE and CONAE), leading the design and implementation of the Ilumex project in 1994. Key interventions in USAID's current activities will include auditing industries to improve their energy efficiency and reduce pollution, and providing loans and equity capital to

Mexican environmental entrepreneurs through the Environmental Enterprises Assistance Fund (EEAF). Bilateral assistance from the US also includes support from the EPA and the DOE under an intergovernmental agreement between the USDOE and Mexico's Secretariat of Energy for energy cooperation. Annex 1 presents summary descriptions of recently completed on ongoing activities supported in the agreement.

In the private sector, energy efficiency market activities are gradually expanding in Mexico, with a focus on the more lucrative market opportunities in the industrial sector, notably in cogeneration applications. The number of private sector firms describing their activities as energy services is still relatively small: CONAE's directory lists nearly 50 self-described energy service companies, but they are primarily small engineering consultancies with little experience in energy-efficiency project development. Of the active companies providing turnkey energy efficiency services, many focus on lighting, motors, and demand controllers.

High interest rates have driven the market towards efficiency applications that have extremely fast payback periods – typically one year or less. Many local service providers express interest in developing cogeneration projects, but the lack of transparent and predictable grid access, power purchase agreements, and long term fuel supply contracts, coupled with the high interest rates, has all but eliminated market activity.

ANNEX 1:
Summary Descriptions of Energy Efficiency
Projects Supported by Bilateral Assistance from
United States Agencies

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Project Title: Pilot Project to Substitute High Efficiency Electric Motors

Applicable Annex Article 2 Item Number(s): 5, 8

Sponsor: USAID/G/ENV/EET

Implementing Institution: Hagler-Bailly

Contact Person: Mark Oven (703-351-0300)

Approximate Project Funding Level: \$700,000

Starting Year and Ending Year (or Proposed Starting Year): 1993-1997

Mexican Partners or Clients: Fideicomiso de Apoyo al Programa de Ahorro del Sector Electrico (FIDE)

Short Paragraph Describing the Work:

This pilot program collaboration between USAID and FIDE focused on substituting high efficiency electric motors for standard motors. This program, covering 20 medium sized industries, was developed as the first industrial demand side management project in Mexico. Through the program, local consultants carried out motors systems audits in industry. Motor manufacturers and distributors signed on to participate in the program as trade allies. Fide worked to secure favorable financing for the implementation of the energy efficient options identified in the audits. Promotional efforts led by the program's Mexican partners make available current information about the advantages of replacing standard motors with energy efficient motors. The program developed a methodology for motor evaluation now used in audits throughout Mexico. In addition, case studies were developed and disseminated to demonstrate the economic advantages of energy efficient motors to new industries. The ultimate objective of the pilot project, to design a large-scale national motors program, was fulfilled in early 1998 when FIDE, CFE and IDB agreed to fund a \$46.8 million DSM program based on incentives, market transformation and ESCO promotion activities. Rebates for high efficiency motors are one of the key elements of this program.

Project Title: Energy Efficiency Motor Rewind Project

Applicable Annex Article 2 Item Number(s): 5, 4

Sponsor: USAID/G/ENV/EET

Implementing Institution: Hagler-Bailly

Contact Person: Mark Oven (703-351-0300)

Approximate Project Funding Level: \$150,000

Starting Year and Ending Year (or Proposed Starting Year): 1996-1998

Mexican Partners or Clients: Fideicomisio de Apoyo al Programa de Ahorro del Sector Electrico (FIDE)

Short Paragraph Describing the Work:

USAID is conducted a pilot study to complement the high efficiency motor pilot project (see previous project summary). The long term goal of the project is to reduce motor efficiency degradation during the rewind process. This project had 2 major components:

1. to provide real data on effects of typical rewind practices on motor efficiency, and
2. to create a training program for rewind shops and develop and disseminate guidelines for better motor rewind practices.

The project included the following components:

- survey of 100 industrial plants in the Mexico City area to determine their practices regarding motor repair and new motor purchase, and their knowledge of motor rewinding
- survey of approximately 40 rewind shops in the Mexico City area to determine their rewinding equipment and practices
- tests on different motors before and after different types of rewinds
- development of proper rewinding guidelines for rewind shops, as well as for industries to demand from their rewind shops
- demonstration of proper rewinding techniques at various shops
- development of a training course and a 20-minute video showing proper rewind practices

The program projected potential national level savings from improved rewinds, and results are in the process of being discussed and evaluated for further activities.

Project Title: Energy Savings Persistence and End-Use Saturation Survey

Applicable Annex Article 2 Item Number(s): 9

Sponsor: USAID/G/ENV/EET

Implementing Institution: Hagler-Bailly

Contact Person: Mark Oven (703-351-0300)

Approximate Project Funding Level: \$50,000

Starting Year and Ending Year (or Proposed Starting Year): 1997-1998

Mexican Partners or Clients: Fideicomiso de Apoyo al Programa de Ahorro del Sector Electrico (FIDE)

Short Paragraph Describing the Work:

USAID is assisting FIDE in the development and implementation of survey research in the areas of persistence of energy savings from prior energy efficiency program efforts and development of estimates of end-use saturation for commercial and industrial facilities. Persistence of savings is a crucial determinant of the long-term effectiveness of programs to foster energy efficiency implementation. FIDE has tried to indirectly estimate persistence of savings in previous surveys but they have not designed an explicit approach to target this issue.

Project Title: Energy Efficient Appliance and Building Standards

Applicable Annex Article 2 Item Number(s): 3

Sponsor: USAID/G/ENV/EET

Implementing Institution: Lawrence Berkeley National Laboratory (LBNL)

Contact Person: Steve Wiel (510-486-5396)

Approximate Project Funding Level: \$200,000

Starting Year and Ending Year (or Proposed Starting Year): 1993-1998

Mexican Partners or Clients: Comision Nacional para el Ahorro de Energia (CONAE), Fideicomiso de Apoyo al Programa de Ahorro del Sector Electrico (FIDE), Comision Federal de Electricidad (CFE), Federacion de Colegios de Ingenieros Civiles (FECIC), and Instituto de Investigaciones Electricas (IIE).

Short Paragraph Describing the Work:

USAID work with the Government of Mexico and the following institutions: CONAE, FIDE, CFE, IIE. FESIC has supported the development and implementation of energy efficiency standards for consumer appliances and commercial buildings. Mexico is developing these standards to meet legislatively-mandated deadlines. USAID, through LBNL, is providing technical assistance in formulating and implementing standards. Specifically, USAID brings experience in assessing and improving methodologies for designing standards, and evaluating the impact of standards once they are in place.

In the case of the commercial building standards, support was provided to the Mexicans when the standard was first being drafted in 1993. An analysis was performed to help determine the energy and cost benefits of various energy efficiency options specific to Mexican commercial buildings and those results were delivered to CONAE. In addition, once the standards were published in Mexico, a public comment period ensued and the USAID team continued to provide comment and technical support in the revisions to the standard that ensued until its approval March of 1995. Since then, support has been provided to assist with the implementation of the new standard.

Project Title: Association of Energy Conservation Technicians and Professionals (ATPAE)
Conference Support

Applicable Annex Article 2 Item Number(s): 4

Sponsor: USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: Hagler-Bailly

Contact Person: Mark Oven (703-351-0300)

Approximate Project Funding Level: \$30,000/year

Starting Year and Ending Year (or Proposed Starting Year): 1994-1998

Mexican Partners or Clients: Association of Energy Conservation Technicians and Professionals (ATPAE)

Short Paragraph Describing the Work:

ATPAE is the premier energy efficiency NGO in Mexico. It operates as a professional association, offering information, training courses, and an annual conference. For several years USAID has supported the ATPAE annual conference, providing speakers, video conferencing and travel for experts from other Latin American countries to participate. In conjunction with the conference, USAID has also offered 1-day training courses on steam systems efficiency and electric power quality, DSM and distributed generation.

Project Title: Comision Nacional para el Ahorro de Energia (CONAE) Energy Efficiency Financing Support

Applicable Annex Article 2 Item Number(s): 7, 8

Sponsor: USAID/Meico

Implementing Institution: Hagler-Bailly

Contact Person: Mark Oven (703-351-0300)

Approximate Project Funding Level: \$40,000

Starting Year and Ending Year (or Proposed Starting Year): 1997-1998

Mexican Partners or Clients: Comision Nacional para el Ahorro de Energia (CONAE)

Short Paragraph Describing the Work:

USAID, in collaboration with CONAE, is developing and making available on the Internet, high value information on energy efficiency financing. This activity also includes the development of a spreadsheet tool for the financial cash flow analysis of energy efficiency projects based on actual operating and financing conditions in Mexico. The tool account for all the variations in lending conditions and criteria depending on the size, financial condition, and type of production of the company seeking financing. It includes rules of thumb for projects size ranges that can be attended by different financing mechanisms. The goal of this activity is to strengthen CONAE's ability to play a more important role as a broker of energy efficiency project implementation in Mexico by providing them with a universally applicable tool for evaluating the financial viability of energy efficiency projects.

Project Title: Sustainable Cities Initiative in Monterrey

Applicable Annex Article 2 Item Number(s): 5, 8

Sponsor: USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: Hagler-Bailly

Contact Person: Mark Oven (703-351-0300)

Approximate Project Funding Level: \$200,000

Starting Year and Ending Year (or Proposed Starting Year):

Mexican Partners or Clients:

Short Paragraph Describing the Work:

The Sustainable Cities Initiative is designed to bring sustainable energy services and technologies on a city-wide scale to pilot cities on a demonstration basis. First stages of this initiative included the formulation of a group of 20 energy efficiency and clean energy production companies assembled into the Business Coalition for Sustainable Cities.

In Monterrey, one of Mexico's most industrialized cities, the project provides technical support in selected industries as the basis to foster partnerships between the public and private sectors in carrying out a broader energy and environmental effort. It creates demand for combined energy efficiency and pollution prevention technologies and services, linking its activities to other on-going programs in Monterrey related to energy and environment. The project also integrates the technical efforts in industrial audits with broader training, study tour and technology demonstration activities, as well as public policy and local government support for information dissemination.

Project Title: Mexico Public Sector Energy Efficiency Project

Applicable Annex Article 2 Item Number(s): 1,2,4

Sponsor: USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: The National Association of State Energy Officials (NASEO) and the California Energy Commission (CEC) as contracted by Hagler-Bailly.

Contact Person: David Terry, NASEO [dsterry@erols.com]

Approximate Project Funding Level:

Starting Year and Ending Year (or Proposed Starting Year):

Mexican Partners or Clients:

Short Paragraph Describing the Work:

The purpose of the Mexico Public Sector Energy Efficiency Project is to identify potential roles for U.S. AID and other foreign agencies in the support of energy efficiency improvements in Mexico's public sector. The project would:

1. Review U.S. experience from one or more U.S. states and the federal government in the improvement of energy efficiency in government services, particularly public lighting, water and sewage pumping and public buildings.
2. Participate in the international cogeneration conference (IV Congreso Internacional de Cogeneraci n) in Mexico City, July 15-17, 1998. Organized by CONAE, this is the definitive technical meeting on cogeneration in Mexico.
 - a) Provide one or more technical speakers to discuss experiences in US and in particular US states with cogeneration projects, project development, industry evolution, policy initiatives, lessons learned, and operating experience with innovative cogeneration projects.
 - b) Publicize the equipment and services exhibit to interested companies.
 - c) Provide a one-day training course, including speaker(s) and materials on one or more cogeneration topics to be discussed and finalized with CONAE. English language presentation and materials would be acceptable.
3. Participate in a study tour, organized by Hagler Bailly, for Mexican professionals from energy efficiency agencies and electric utilities to understand the activities comprising program evaluation, and to hear US experiences in this area.
4. Review information and research results obtained by the project.
5. Participate in one or more one-week missions to Mexico City led by Hagler-Bailly to discuss approaches to public sector energy efficiency improvement with USAID, CONAE, FIDE and Banobras.

Project Title: Trade and Investment (T&I) Program

Applicable Annex Article 2 Item Number(s): 1, 4

Sponsor(s): Export Council for Energy Efficiency, USDOE

Implementing Institution: Alliance to Save Energy (ASE)

Contact Person: Joe Loper, (202) 530-2223

Approximate Project Funding Level: \$50,000

Starting Year and Ending Year (or Proposed Starting Year): 1998 - 1999

Mexican Partners or Clients: There are three types of Mexican partners and clients that ASE works with to conduct education and marketing seminars:

1) U.S. and international energy-efficiency companies serve as educators in the seminars and identify energy-saving opportunities for the specific audiences. For example:

Air-conditioning -- Carrier, FADIN, Lennox/Frigus Bohn, Termo Tecnica Quin, TRANE, York

Controls -- ASI Controls, Johnson Controls, Honeywell

Cogeneration -- AGC/Seisa, Trigen, Ultra Energia

Energy services and maintenance -- CES/Transcom, Energy Saving de Mexico, Energy Solutions International, Enviro Management Resources, LightMedia Corp., Target Technologies, World Energy Solutions

Monitoring and metering equipment: E-mon/O'Larr

Motors and drives -- Baldor, Danfoss, Magnetek, Rockwell/Allen Bradley

Sensors, lighting and occupancy -- The Watt Stopper, MYTECH, SensorSwitch

Solar water heating -- Celsol

Boilers/Steam -- Aerco International/Fritech Inc., Fulton Boilers/LORSA Co., Armstrong International, Spirax Sarco

2) Energy managers from large, energy-using companies attend the seminars while trade associations co-host the events. Audience members learn about the environmental and economic benefits of energy efficiency and meet with suppliers of technology and services. Examples of such associations include CAINTRA, COPARMEX, the Maquiladora Association, Hospital Associations, and different regional Hotel Associations.

3) Host-country, energy-saving government agencies share information about their institutional program opportunities to end-user and energy efficiency companies at the seminars. Multiple representatives from the government energy conservation offices, Comission Nacional para el Ahorro de Energia (CONAE) and Fideicomiso para el Ahorro de Energia Electrica (FIDE) continue to participate in the T&I seminars.

Short Paragraph Describing of the Work:

The Alliance to Save Energy's Trade and Investment (T&I) Program was born out of involvement in the USAID Monterrey, Mexico Sustainable Cities Program in 1995. To date the T&I program has:

- held ten educational energy efficiency seminars and trade missions in six different Mexican cities (Cancun, Guadalajara, Mexico City, Monterrey, Reynosa, and Villahermosa).
- involved over 40 different U.S. and Mexican energy efficiency companies that have participated 56 times with their own funds,
- reached over 400 Mexican energy managers and other representatives from over 200 industrial, commercial building, hotel, and hospital facilities,
- had multiple representatives from CONAE and FIDE inform audience members of their efficiency programs.

Three goals of the T & I Program in Mexico are:

1. To raise the level of awareness and understanding about how saving energy both saves money and protects the environment.
2. To provide Mexican energy end-users access to energy-saving technologies and services and sources of financing.
3. To develop the Mexican capacity to deliver energy efficiency products and services by helping Mexican engineering and manufacturing firms partner with U.S. efficiency companies.

Project Title: The Mexico-U.S. Energy Training Partnership (MUSETP)

Applicable Annex Article 2 Item Number(s): 4

Sponsor(s): USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: The Energy Group, Institute of International Education (IIE/EG)

Contact Person: Richard Krasnow; tel: 202.326.7808; fax: 202.326.7694; email: rkrasnow@iie.org

Approximate Project Funding Level: \$1,500,000

Starting Year and Ending Year (or Proposed Starting Year): 1993-1997

Mexican Partners or Clients:

These technical workshops trained a total of 1300 professionals.

Instruction was jointly provided by U.S. and Mexican experts. In-country institutional partners included:

- * CONAE
- * FIDE
- * Asociacion Nacional de Energia Solar
- * Chihuahua Rural Development Agency
- * CANACINTRA
- * FIRCO (Sonora, Chihuahua, Oaxaca)
- * Quintano Roo Secretaria de Infraestructura, Medio Ambiente y Pesca
- * State of Baja California Sur Economic Development Agency (DGFICM)
- * AmCham (Guadalajara)
- * Mexicana de Cobre
- * Universidad of Chihuahua
- * Universidad of Quintano Roo
- * Universidad Autonoma of Baja California Sur
- * Instituto Mexicano del Petroleo
- * ITSEM (Monterrey Tech)
- * International Institute for Environmental Technology & Management

Short Paragraph Describing of the Work:

The Project's initial activity was a needs assessment workshop in Mexico City in June 1993, in which three priority areas were identified as central to promoting GHG emission reductions as well as yielding other environmental and economic benefits:

- * renewable energy;
- * energy efficiency; and
- * environmental management.

MUSETP subsequently developed and delivered 21 technical training workshops in Mexico, which trained 1300 professionals. Instruction was jointly provided by U.S. and Mexican experts.

As part of MUSETP, IIE/EG developed a satellite-based training program (SBT) to provide distance learning training workshops on Energy Efficiency in Industrial Plants. This innovative SBT component was utilized to train 495 participants in several downlink sites throughout the country, and it was made possible through a collaboration between IIE/EG, FIDE and CANACINTRA -- the latter two being leading Mexican organizations on energy efficiency and satellite-networking for industry, respectively.

Also to be noted is the positive synergy that was developed and existed between the training activities provided under MUSETP implemented by IIE/EG and the technical assistance provided under the Renewable Energy for Productive Activities project coordinated by Sandia National Laboratories. The fact that the TA project had an early start and continued beyond the training allows us to see some early results and to be confident of a successful contribution to renewable energy project development in Mexico. As such, this component carries a strong potential for long-term impacts towards the reduction of GHG in Mexico. Energy efficiency in building and in the transportation sector were implemented in the last phase of MUSETP; the aggregate impact in those sectors are likely to take a longer time to become apparent.

MUSETP was implemented under the USAID Energy Training Program, which was completed in September 1997. The successor to USAID/ETP is the Energy & Environment Training Program (EETP), which was awarded by USAID in August 1998.

Project Title: Energy Efficiency in Steam Generation and Distribution Systems Pilot Project

Applicable Annex Article 2 Item Number(s): 3, 4, 8

Sponsor(s): USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: Hagler Bailly

Contact Person: Mark Oven; tel: 703-351-0300; email: MOVEN@HaglerBailly.com

Approximate Project Funding Level: \$600,000

Starting Year and Ending Year (or Proposed Starting Year): 1995-1998

Mexican Partners or Clients: CONAE

Short Paragraph Describing of the Work:

With CONAE and through Mexican consultants, an audit methodology for industrial steam generation and distribution systems was developed. Six Mexican consulting firms were selected to carry out the audits, and were trained in the methodology. A total of 37 plants were selected to be representative of the industrial sector, and audits were carried out. A two-day training course on steam systems efficiency was developed and made available to staff of each of the audited companies. Contacts with equipment vendors resulted in equipment and price information which was made available to the audited plants. A data base of plant information and audit results has been compiled, and results are being analyzed to project savings and investment potential in the whole industrial sector. Process and impact evaluations of the pilot project are being completed. A final report summarizing the project and recommending policies for improvement in steam systems efficiency in Mexican industry will be finalized.

Project Title: Targeted Technical Assistance Support to FIDE

Applicable Annex Article 2 Item Number(s): 5, 6, 8

Sponsor(s): USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: Hagler Bailly

Contact Person: Mark Oven; tel: 703-351-0300; email: MOVEN@HaglerBailly.com

Approximate Project Funding Level: \$100,000

Starting Year and Ending Year (or Proposed Starting Year): 1998

Mexican Partners or Clients: FIDE

Short Paragraph Describing of the Work:

To maximize the effectiveness of FIDE implementation of the CFE-IDB incentive program for electricity efficiency improvement, USAID/Mexico is providing a number of targeted support activities. These have included the following: input to overall program design; transfer of US experiences and technical information on subjects such as energy financing, program evaluation, market transformation; design of a one-week study tour in the US on financing energy efficiency projects; co-sponsorship of an international ESCO workshop in Mexico City; and supporting an expert seminar on the development of commercial lighting programs.

Project Title: Electronic Methodologies for Energy Efficiency Analysis

Applicable Annex Article 2 Item Number(s): 1, 3, 5, 8

Sponsor(s): USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: Hagler Bailly

Contact Person: Mark Oven; tel: 703-351-0300; email: MOVEN@HaglerBailly.com

Approximate Project Funding Level: \$160,000

Starting Year and Ending Year (or Proposed Starting Year): 1998

Mexican Partners or Clients: FIDE

Short Paragraph Describing of the Work:

Working primarily through local consultants, USAID is helping FIDE develop 3 software programs to support energy efficiency analysis and decision-making for end-users and energy consultants: motor system efficiency; pumping system efficiency; and compressed air system efficiency. The motor and pumping system software programs are being created in Mexico, using the experience of similar software as models. For the compressed air program, discussions are being finalized with USDOE to translate and adapt a version of the AirMaster software which is part of the Motor Challenge program. FIDE and CONAE will eventually distribute these software programs among users, and provide technical support.

Project Title: Residential Lighting Program Evaluation Support

Applicable Annex Article 2 Item Number(s): 3, 8

Sponsor(s): USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: Hagler Bailly

Contact Person: Mark Oven; tel: 703-351-0300; email: MOVEN@HaglerBailly.com

Approximate Project Funding Level: \$150,000

Starting Year and Ending Year (or Proposed Starting Year): 1998

Mexican Partners or Clients: FIDE

Short Paragraph Describing of the Work:

USAID/Mexico, through US and Mexican consultants, is working to support FIDE in the evaluation of residential lighting programs in 3 cities: Valladolid, a CFE-PAESE program from 1992; Aguascalientes, a FIDE program from 1995-96; and Ciudad Juarez, a FIDE program from 1997. Process and impact evaluations are being designed under overall FIDE supervision, and will provide an interesting study of 3 different programs from different periods targeted at the residential lighting market. The evaluations will provide input to the design of current residential lighting programs, and will measure both specific effects of the programs and an estimate of progress in the transformation of the residential lighting equipment market in Mexico. Under this activity, USAID/Mexico has also designed a one-week study tour on program evaluation for a group of Mexican experts from FIDE, CONAE, CMPL and IIE.

Project Title: Audit Implementation Support

Applicable Annex Article 2 Item Number(s): 3, 5

Sponsor(s): USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: Hagler Bailly

Contact Person: Mark Oven; tel: 703-351-0300; email: MOVEN@HaglerBailly.com

Approximate Project Funding Level: \$50,000

Starting Year and Ending Year (or Proposed Starting Year): 1998

Mexican Partners or Clients: Instituto de Protección Ambiental (IPA)

Short Paragraph Describing of the Work:

This task provides follow-up to six integrated pollution prevention and energy efficiency audits carried out in collaboration between USAID and IPA in the Monterrey area in 1997. For each audited plant, a local consulting firm will carry out monthly visits and meetings over a six-month period, provide technical support as necessary (preparation or review of technical specifications, development or review of price quotations, additional measurement, etc.), and document progress in implementation of the measures identified.

Project Title: Municipal Energy Efficiency Potential

Applicable Annex Article 2 Item Number(s): 7, 8

Sponsor(s): USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: Hagler Bailly

Contact Person: Mark Oven; tel: 703-351-0300; email: MOVEN@HaglerBailly.com

Approximate Project Funding Level: \$50,000

Starting Year and Ending Year (or Proposed Starting Year): 1998

Mexican Partners or Clients: CONAE

Short Paragraph Describing of the Work:

USAID/Mexico is carrying out an assessment of the energy efficiency potential in the municipal sector, focusing on public lighting and water pumping. While various agencies have carried out pilot projects in these areas, an overall assessment of energy saving potential has never been done. USAID consultants are coordinating with CONAE, CFE, FIDE, Banobras and others to evaluate results of activities to date, as well as to obtain and compile basic data on the municipalities. The results of the study will provide a basis to develop plans for energy efficiency activities in the municipal sector, and evaluate the possibilities for participation of USAID and international agencies such as the World Bank and the GEF in municipal projects in Mexico.

Project Title: Energy Efficiency Component of Cleaner Production Audits

Applicable Annex Article 2 Item Number(s): 5

Sponsor(s): USAID/G/ENV/EET, USAID/Mexico

Implementing Institution: Hagler Bailly

Contact Person: Mark Oven; tel: 703-351-0300; email: MOVEN@HaglerBailly.com

Approximate Project Funding Level: \$40,000

Starting Year and Ending Year (or Proposed Starting Year): 1998

Mexican Partners or Clients: CMPL (Mexican Cleaner Production Center)

Short Paragraph Describing of the Work:

In addition to providing funding for some of the cleaner production activities of this Center in Mexico City, USAID/Mexico is also providing support to complement four cleaner production audits in the chemical sector with energy efficiency-related measurements and analysis. Based on successful activities in the electroplating and foundry sectors in previous years, an energy expert has been integrated into the cleaner production audit team, and energy audit steps have been incorporated into the overall methodology.

Project Title: CONAE/EPA Voluntary Program Information Exchange

Applicable Annex Article 2 Item Number(s): 1, 8

Sponsor(s): U.S. Environmental Protection Agency

Implementing Institution: ICF Kaiser

Contact Person: David Antonioli; tel: 202-862-1149; email: dantonioli@icfkaiser.com

Approximate Project Funding Level: \$110,000

Starting Year and Ending Year (or Proposed Starting Year): 1997-1998

Mexican Partners or Clients:

National Commission for Energy Conservation (CONAE)

Short Paragraph Describing of the Work:

EPA developed a week-long information exchange workshop for representatives of CONAE on the various aspects of the design, implementation, and evaluation of a voluntary program to promote energy efficiency in commercial buildings. As part of this effort, EPA led a mission to Mexico to gather information about both the energy efficiency sector and CONAE's needs. During the mission, EPA facilitated a series of sessions with various CONAE staff to identify the key stakeholders and the goals and strategies of the program, as well as CONAE's interests in specific elements of EPA's program. EPA then developed a week-long workshop for CONAE staff on the various elements of EPA's Green Lights/Energy Star Buildings Program. The workshop took place in March 1998.

Project Title: Performance Contract Financing

Applicable Annex Article 2 Item Number(s): 6

Sponsor(s): Environmental Enterprises Assistance Fund (EEAF)

Implementing Institution: EEAF (through USAID funding sources)

Contact Person: Mary Ann Alger, ph: 703.522.5928; email: alger@eeaf.org

Approximate Project Funding Level: \$120,000

Starting Year and Ending Year (or Proposed Starting Year): 1998 - 2003

Mexican Partners or Clients:

Empresas ESM, S.A. de C.V.; Monterrey, Mexico

Short Paragraph Describing of the Work:

EEAF has financed two of Empresas ESM's performance contracts with one of its clients, wherein Empresas ESM has installed a energy efficiency system with on-site monitoring. Without EEAF's financing these creditworthy projects may not have been financed and/or would have taken longer to implement. EEAF's borrower competes against other Mexican and U.S. ESCOs.

Project Title: ESCO Installation Financing

Applicable Annex Article 2 Item Number(s): 6

Sponsor(s): Environmental Enterprises Assistance Fund (EEAF)

Implementing Institution: EEAF (through USAID funding sources)

Contact Person: Mary Ann Alger, ph: 703.522.5928; email: alger@eeaf.org

Approximate Project Funding Level: \$150,000

Starting Year and Ending Year (or Proposed Starting Year): 1998 - 2003

Mexican Partners or Clients:

ESCO located in Mexico City

Short Paragraph Describing of the Work:

EEAF will finance three of this ESCO's installations in Mexico. EEAF's financing is for 5 years. EEAF will share in the cost savings.

Project Title: United States ñ Mexico Border Energy Forum

Applicable Annex Article 2 Item Number (s): 8

Sponsor: US DOE (and many additional US institutions)

Implementing Institution: Texas General Land Office

Contact Person: Soll Sussman (512-463-5039)

Approximate Project Funding Level: DOE contribution = \$15,000/year

Starting Year and Ending Year: ongoing since 1994; meets annually

Mexican Partners :

Secretaría de Energía

Comisión Reguladora de Energía

Fideicomiso para el Ahorro de Energía

Comisión Nacional para el Ahorro de Energía

Instituto Tecnológico y de Estudios Superiores de Monterrey

Universidad Autónoma de Chihuahua

Universidad Autónoma de Nuevo León

Instituto Autónomo de Investigaciones Ecológicas

Consejo de Energía del Estado de Baja California

Dirección de Catastro Estatal de Tamaulipas

Dirección de Ecología de Coahuila

Federación Mexicana de Asociaciones Privadas de Salud y Desarrollo Comunitario

Asociación Mexicana de Gas Natural

Secretaría de Desarrollo Económico de Nuevo León

Promotora de la Industria Chihuahuense

El Colegio de la Frontera Norte

Short Paragraph Describing the Work:

The goal of the annual Border Energy Forum since its first meeting in 1994 has been to bring together leaders from industry, government, educational institutions and environmental organizations to address the vital issues of energy and the environment affecting the rapidly developing region of northern Mexico and the southwestern United States. It is intended as a think tank that convenes each year.

As immediate crises are handled, steps need to be taken to facilitate the flow of information about energy and its relationship to the environment across the border and into the hands of policy level planners and action agencies in both countries. The Border Energy Forum emphasizes communications about critical energy needs and priorities at a local, state and regional level, where these issues have not traditionally been discussed.

Seminar on Utility Costing and Project Evaluation

Day 1 Project Evaluation Hanoi Tuesday April 27, 1999		
0800 – 0815	EVN Opening Remarks: Relevance of Costing and Project Evaluation to Financing G, T&D Projects in the Future for EVN	EVN TBD
0815 – 0830	Bechtel Opening Remarks <ul style="list-style-type: none"> • Introduction of Participants • Overview of Project and Seminar 	Mr. T. Simpson, Bechtel
0830 - 0945	Utility Economics Review <ul style="list-style-type: none"> • Capital and Operating Costs • Revenue Requirements • Tariffs and Revenue Recovery • Value to Customer vs. Cost to Utility 	Mr. B. Wood, Bechtel
0945 – 1000	<i>Break</i>	
1000 – 1130	Project Evaluation 1 <ul style="list-style-type: none"> • Project Cost Elements • Project Cost and Value to Customer <ul style="list-style-type: none"> ➢ Generation Projects ➢ Transmission Projects ➢ Distribution Projects 	Mr. T. Simpson, Bechtel
1130 – 1330	<i>Lunch Break</i>	
1330 – 1500	Project Evaluation 2 <ul style="list-style-type: none"> • Cost Benefit Assessment • Financial Analysis 	Mr. B. Wood, Bechtel
1500 – 1515	<i>Break</i>	
1515 – 1630	Integration of Costing and Project Evaluation	Mr. T. Simpson, Bechtel

Seminar on Utility Costing and Project Evaluation

Day 2

Costing and Activities Based Management

Hanoi Wednesday April 28, 1999

0800 – 0945	Unbundling Costs into Value Activities 1 <ul style="list-style-type: none">• Activity Categories• Cost Allocation• Per Unit Costs of Electricity Services	Mr. B. Wood, Bechtel
0945 – 1000	<i>Break</i>	
1000 – 1130	Unbundling Costs into Value Activities 2 <ul style="list-style-type: none">• Transmission Pricing• Pricing Ancillary Services• Power Purchase Agreements• Transfer Pricing Mechanisms	Mr. T. Simpson, Bechtel
1130 – 1330	<i>Lunch Break</i>	
1330 – 1500	Activity Based Costing and Resource Allocation <ul style="list-style-type: none">• Allocating Resources to Activities• Activity Based Budgeting• Budget Prioritizing/Meeting Customer Needs	Mr. B. Wood, Bechtel
1500 – 1515	<i>Break</i>	
1515 – 1630	Activity Based Management <ul style="list-style-type: none">• Performance Measures for G, T & D• Performance-Based Revenue Mechanisms• Benchmarking Utility Performance and Practices• Software for Activities Based Management	Mr. T. Simpson, Bechtel

Seminar on Utility Costing and Project Evaluation

Day 3

Workshop on Activities Based Costing and Project Evaluation

Hanoi Thursday April 29, 1999

0800 – 0815 Workshop Approach Mr. T. Simpson,
Bechtel

0815 – 0930 Cost Unbundling in Practice: Example Mr. B. Wood,
Bechtel

- Review of Key Concepts
- ABC Utility Outline and Costs
- Definition of Activity Categories
- Cost Allocation
- Per Unit Cost of Electricity Services
- Marginal Costs
- Activity Based Budgeting at ABC Utility

0930 – 0945 *Break*

0945 – 1100 Project Evaluation in Practice: 3 Examples Mr. T. Simpson,
Bechtel

- Review of Key Concepts
- Generation Project Evaluation
- Transmission Project Evaluation
- Rural Electrification Evaluation

1100 – 1130 Conclusion and Presentation of Course Mr. T. Simpson,
Certificates Bechtel