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MOVING MARKETS FOR ENERGY EFFICIENCY (USAID GLOBAL PROJECT)

COUNTRY WORKING PAPER
BRAZIL

(Working Paper Prepared as Part of the IQC Task Order No. 3)

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I. BACKGROUND AND MISSION OBJECTIVES

A. MMEE PROJECT BACKGROUND

The experience with energy efficiency and DSM technologies and programs in the U.S. and many developing countries demonstrates the benefits of energy efficiency in improving competitiveness and simultaneously reducing greenhouse gas (GHG) emissions. The GCC issues and financing concerns related to the construction and operation of new energy facilities in developing countries have increased the interest in the potential for applying energy-efficient approaches, products, and equipment to avoid or postpone the need for such facilities. However, while many of the technologies for energy efficiency are well established and pose no technical constraints, a large number of barriers continue to limit the implementation of energy efficiency. As a result, despite significant benefits of energy efficiency to facility owners and to society, there has been relatively little implementation of energy efficiency options by customers, utilities and governments in developing countries.

The barriers to implementation include real or perceived economic and financial constraints, social and psychological perceptions, lack of effective demonstration and outreach programs, and policies that have limited effectiveness in achieving the needed market transformation and private sector participation. There has been a great deal of effort devoted to estimating energy efficiency potential, identifying barriers to implementation, and developing policy actions to overcome them, but there have been few results in terms of actual market implementation. Some of the reasons for this include the following:

- Many of the previous efforts have been focused on specific barriers to implementation without a comprehensive approach to the implementation problems and issues
- Most of the prior efforts primarily address public policy initiatives

- There has been insufficient emphasis on the role of the private sector and financial institutions

Further, the current economic and financial problems of the developing world pose new challenges and barriers for implementation of energy efficiency.

The Office of Energy, Environment, and Technology in USAID Global Bureau's Environment Center has initiated the Moving Markets for Energy Efficiency (MMEE) Project to achieve long-term market transformation by developing the enabling framework for stimulating private sector implementation of energy efficiency service delivery in developing countries. The MMEE Project will contribute to the Environment Center's program of Increased Energy Efficiency (Intermediate Result IR 3.1 under the Strategic Objective SO3), which focuses on fostering environmentally sound economic growth by promoting the efficient use of energy in developing countries.

Consistent with this strategic objective, the Center is interested in developing the policy, financial, information and institutional responses to energy challenges, by integrating public and private problem-solving approaches and by increasing private sector awareness of and involvement in energy efficiency solutions worldwide. The Center believes that there is a need for a comprehensive approach that will include the enabling policy, legislative, regulatory and financial frameworks and related implementation strategies and tools to facilitate the delivery of a wide range of energy services. Such an approach will identify the most effective means to stimulate the establishment and growth of energy efficiency service providers in developing countries. This will require the coordination of the activities of policy-makers and regulators, utilities, entrepreneurs, developers and investors, the donor community, in-country and offshore financial institutions, equipment manufacturers and suppliers, designers, contractors and installers, and energy end users.

It is anticipated that the MMEE Project will result in a number of contributions to fostering private sector led energy efficiency services including the following:

- Adoption and implementation of new energy efficiency policies and regulations
- Leveraging of public and private sector investment for energy efficiency
- Establishment of energy service companies (ESCOs) and energy services performance contracting (EPC) projects in selected countries
- Creation of additional multilateral development bank (MDB) lending for energy efficiency
- Adoption of improved operating procedures and technologies by public institutions
- Demonstration of business-based solutions to energy efficiency implementation

The MMEE Project will also contribute to the definition of approaches for monitoring and verifying carbon emission reductions resulting from energy efficiency projects. Specifically, the MMEE Project will include the following targeted objectives:

1. Develop a comprehensive approach to promote private sector solutions to energy efficiency
2. Create the enabling policy, legislative, regulatory and financial framework and related market infrastructure
3. Develop market-based implementation strategies involving a mix of public and private initiatives
4. Develop guidebooks, decision models, case studies, and other resource materials targeted at policy-makers, regulators, financial institutions, and private sector entrepreneurs to facilitate the establishment of energy services businesses
5. Create a long-term, sustainable mechanism for ongoing communication and dissemination of information and results

6. Conduct a series of Regional Workshops and targeted dissemination activities in selected countries to define and facilitate specific local energy services activities

7. Leverage investment and support from other government agencies, multilateral or bilateral donor organizations, and private sector financial institutions

8. Achieve demonstrable results in selected countries

The Bechtel Consortium, one of the Energy IQC Contractors has assembled a highly qualified team to support the Center in the implementation of the MMEE Project.

B. COUNTRY MISSION OBJECTIVES

One of the key objectives of the MMEE Project is to conduct a series of regional workshops in selected countries to define and facilitate specific private sector led in-country energy services activities. As part of this approach, the Project Team has selected a number of countries including Brazil in consultation with USAID officials. The selection criteria for the countries included the following:

1. the status of the country as a USAID Program country;

2. the status of the economy, the power sector, extent of sectoral reform, size of energy market, etc.;

3. the progress made in the country in the area of energy efficiency, the extent of involvement in energy efficiency policy, regulation, market reform, etc. by the public sector, private sector, NGO and other advocacy groups;

4. the donor activity in the area of energy efficiency in the country, including TA grants, loans, etc. which will offer USAID the opportunity to leverage results through MMEE;

5. the overall size of the market for energy efficiency and the prospects for EPC, ESCO, and other mechanisms to penetrate the market in the near term with the potential for sustainability in the long term;

6. the regional significance of the country, especially in terms of common issues and the potential of replication or Mission buy -in for additional workshops;

7. the financial/capital markets in the country in terms of their capacity to participate in financing private sector ESCOs and EE projects;

8. other social, demographic, and economic factors that may have relevance on the attractiveness of the country.

As part of the preparation for a regional ESCO workshop in Brazil, the Project Team visited Brazil during the period October 16-24, 1998 to develop background information. The specific objectives of the country visit were as follows:

1. Review the current structure of the energy efficiency markets, including the relevant macroeconomic and environmental goals and objectives, government (central/state/local) energy and environmental policies, regulatory structure, role of government and private financial institutions, unique barriers to energy efficiency, including macroeconomic and financial considerations, and institutional and social/cultural issues, private sector involvement of energy efficiency service delivery, and planned or proposed public and private sector initiatives (including any activities related to energy industry restructuring)

2. Identify potential for energy efficiency implementation, and determine what has been already achieved

3. Identify case studies of successes and/or failures of past public and private initiatives

4. Define opportunities for stimulation of energy efficiency activities and

5. Identify key energy efficiency stakeholders

6. Evaluate capital availability and investment barriers/drivers

7. Identify approaches or target development opportunities that are consistent with the objectives of local USAID missions and country stakeholders

The final objective of the mission was to develop a Country Working Paper for Brazil on energy markets and status of energy efficiency activities, including the development of a strategy for motivating local institutions and stakeholders in creating a sustainable private sector led energy services markets. The field mission to Brazil coincided with an International Seminar on Energy Efficiency organized by PROCEL (The National Institute for Energy Efficiency in Brazil). During the field mission, members of the Project Team held discussions with a number of key officials from a large number of public agencies, NGOs, private companies, and industry associations on the status and prospects of creating a private sector led ESCO industry. The country mission completed its work and has prepared this Country Working Paper not only for implementation in Brazil but also as a model to be used in other countries in the Latin American Region.

II. THE ENERGY SECTOR

A. HIGHLIGHTS OF THE ENERGY SECTOR

Brazil is currently the largest emitter of greenhouse gases (GHG) in Latin America. In 1991, Brazil was the fifth largest net GHG emitter worldwide. In the five-year period between 1991 and 1995, industrial carbon dioxide emissions in Brazil increased by 20 percent. Given the continuing growth and structural changes in Brazil's economy, it is likely that carbon dioxide emissions will continue to increase at an alarming pace. The USAID/Brazil Clean and Efficient Energy Strategic Objective (SO) addresses the issue of potential growth in GHG emissions as Brazil's economy expands and outgrows its current clean energy base.

In addition, Brazil has been identified as a key country in USAID's Developing Country Climate Change Action Plan (CCAP), not only because of its contribution to net global GHG emissions, but also due to a number of other factors that favor cost effective actions to reduce the GHG emissions growth rate. Specifically, Brazil: (i) is the largest and fastest growing Latin American economy, with significant potential for increasing current GHG emissions; (ii) has abundant resources for sustainable energy production and use, particularly for biomass fuels, solar energy, wind and small-scale hydropower potential; (iii) offers locally supported energy efficiency opportunities with attractive cost/benefit ratios; (iv) has the potential to foster replicable models for clean energy development in the region; and (v) continues to show a clear commitment to significant restructuring and privatization of its energy industry under a competitive environment, including policies conducive to clean and efficient energy options.

Brazil's major goal in the power sector is to guarantee the availability and reliability of electricity to all citizens and economic activities, while converting from a largely state-controlled to a market-driven energy industry, regulated to allow for regional disparities that limit full access to electrical energy. In the next three years, Brazil's

goal is to achieve a balance between attracting private investment to foster expansion needs and maintaining energy prices at a level that does not impede economic growth.

While emissions growth and global climate change considerations have not been of primary concern when expanding the power sector in Brazil, environmental precautions are taken into account when siting new generation facilities and transmission routes. Typical to other countries at similar stages of development, Brazil perceives social exclusion of those cut off from energy services as more harmful to its development than the threat of global climate change. A similar rationale applies to Brazil's perception of energy efficiency. Energy efficiency policy and related goals are driven by the need to optimize resource allocation in an economy where capital stocks are scarce, and not necessarily by global climate change concerns.

These country goals were recently confirmed when the Brazilian Congress enacted legislation that earmarks 50 percent of a federal power investment fund (the Global Guarantee Reserve Fund, or RGR) to energy efficiency, rural electrification, and low income consumer support. Additionally, since mid-1997, following a USAID recommendation, licensing regulations were established in order to direct one percent of gross annual utility revenues to energy efficiency programs, estimated at approximately $200 million per year.

The Government has demonstrated its strong and continued political will to implement power sector reforms through a number of policy and administrative actions. This is especially true of those policies related to energy efficiency and expansion of rural and market-oriented energy services, all targets of the USAID/Brazil Clean and Efficient Energy Strategic Objective.

With the Government of Brazil (GOB) poised to launch such significant restructuring and privatization of its energy sector, it is imperative that USAID take a leading role in shaping these changes. The USAID Mission, by providing technical assistance to the

various energy agencies and organizations, will be allowed a voice in the reform dialog with the GOB, as well as an opportunity to leverage significant amounts of funds. USAID's participation in the process will also help to ensure a level playing field for trade in energy-related goods and services, allowing greater market access for U.S. businesses.

1. Power Sector Restructuring and Privatization

Brazil is restructuring and privatizing its electric power sector, converting from a largely state-controlled system to a market-driven model. The nature of the market model and the necessity of increasing overall economic efficiency are such that this market model will push toward higher efficiency in production and use of energy. Thus, Brazil's energy sector is in a transitional phase, in which policy development and implementation is critically time-sensitive. Although Brazil has created other regulatory bodies, there is virtually no tradition of independent regulation in the country to ensure quality, access, and fairness of energy services, or to enforce the rights and responsibilities of consumers and providers with regard to clean energy options. There is also a strong need to improve the coordination and collaboration among a large number of federal and state energy regulatory agencies, ministries, and private environmental institutes, NGOs, etc.

Parallel to the implementation of privatization, the government has embarked upon a process of decentralizing regulation through strengthening existing state entities and creating new state-level regulatory bodies. The current Ten-year Plan of Eletrobrás, the national electric utility, is the latest edition of an annually updated document that served in the past to focus Eletrobrás' resources and those of its subsidiaries. Centralized government planning previously required that Eletrobrás organize, plan, finance, build, and operate the entire electric power system. Now, however, the Ten-Year Plan (*Plano 2015*) is developed by the Ministry of Mines and Energy. Eletrobrás continues to be directly responsible for implementation. Under the new planning

process, the power sector market structure is shaped through privatization legislation, the decision making authority granted to new regulatory agencies, investment decisions of privatized utilities, Brazilian and foreign investors, development and commercial financing agents, and private power developers. The decisions made in the past by Eletrobrás alone for siting and building new power facilities will now involve a number of additional partners in the private sector.

2. Energy/Economy Relationship and Price Structure

At the present stage of development, the Brazilian economy exhibits a clear trend of increasing levels of energy intensity. Projected economic expansion of three percent per year and the corresponding growth in energy needs (e.g., electricity demand increased 6.5 percent in 1997) will impose considerable demands on Brazil's industry to carry out supply and demand side management measures. In 1997, power shortages in large energy markets like Rio de Janeiro were considered as early warnings of the supply crisis. Major cities in the Amazon region are also under energy rationing schedules (Manaus and Santarém). If the Government of Brazil (GOB) and regulatory agencies are not successful in guiding the market and the privatized utilities to reduce the risk of power shortages, repeated shortages could threaten the implementation of Brazil's privatization schedule as well as economic growth.

However, most of the last large potential hydropower sources close to developed and dense load regions (i.e., the south and southeastern regions of Brazil) have already been developed. *Plano 2015* indicates that the necessary additional installed power plant capacity will come from the remaining hydropower projects in the Southeast and Midwest of Brazil, and untapped resources in the Amazon River Basin (26,318 MW), imported natural gas (5,146 MW), nuclear energy (2,618 MW), coal (1,800 MW) and renewable energy. If the GOB and the regulatory agencies are not successful in guiding the market and the privatized utilities to develop significant efficiency programs and short-term increases in generating capacity, the risk of power shortages

could threaten Brazil's economic growth. This would, in turn, not only call into question the implementation of Brazil's electricity sector privatization schedule, but also public support for the GOB's larger sector reform effort.

The wholesale energy prices for energy in Brazil continue to be below long-run marginal costs. This has resulted in a twofold impact: (i) large energy consumers have little or no financial incentive to invest in energy efficiency; and (ii) energy producers are hindered from investing in efficient generation and T&D technologies that may have a higher initial capital cost but lower overall cost, when compared to other sources, such as renewable energy.

With inflation rates under control and electricity prices increasing (11.8 percent in 1997), the opportunities for energy efficiency measures are considerable, both in energy supply systems and in end-use applications. Privatization of the fixed generation assets and the competitive forces put in play by restructuring will gradually force increases in bulk energy prices towards their full economic recovery cost, a need recognized by the GOB to attract foreign investors. This underlying trend of costs and prices for energy will greatly improve incentives and consumer willingness to use energy more efficiently. By reducing effective demand for energy through cost-effective savings, it is possible to significantly reduce the need for additional fossil-fuel generating capacity.

Under the new regulatory climate, rural communities currently served by subsidized power from state-owned utilities will be subject to a decrease in the quality of the service while unserved rural communities may wind up even further behind if utilities use a conventional approach to the problem (i.e., grid extension). In this scenario where decentralized, local, and clean generation solutions are not customarily examined or promoted, the GOB plans to focus on the promotion of the adoption of market-based practices for clean energy by key actors. In order to achieve increased adoption of clean energy solutions and reach key actors, a balance between top-down and bottom-

up approaches will focus on the areas of policy, financing, training and technology, where major barriers were identified.

In summary, the accompanying and wide-ranging structural and regulatory changes now underway in the power sector in Brazil will help determine the role to be played by environmentally friendly options, such as efficiency measures and increased use of renewable energy in Brazil's energy future.

3. Non-Hydropower Energy Sources

As Brazil's economic growth pushes increased energy needs, it is certain that natural gas will play an increasing, albeit, limited, role in Brazil's energy supply mix, with the Bolivia-Brazil natural gas pipeline being developed. Power generation based on natural gas results in reduced GHG emissions when compared to other fossil fuels (e.g., coal and oil). The increased use of natural gas in Brazil can not only generate the bulk power needed to meet short term needs, but also reduce emissions, particularly when compared as a fuel to Brazil's low quality, high sulfur content, and low energy concentration coal.

Higher capital investment and transportation costs, as well as the low quality of Brazilian coal (high sulfur and ash content) clearly demonstrate that, within the foreseeable future, coal-based power generation is not competitive with natural gas options, increasingly available through the Brazil-Bolivia natural gas pipeline. Considering that even pressurized fluidized bed coal combustion plants produce 1.8 lbs. of CO_2 per generated MWh and renewable energy sources are close to zero emissions, the GOB, after careful examination of the future of coal generation in Brazil, has chosen not to put a major focus on this technology.

Nuclear power is also identified as an option under *Plano 2015*. However, the nuclear power sector is not being privatized, and the Ministry of Mines and Energy maintains all decision controls with respect to this technology.

B. KEY INSTITUTIONS

A large number of public and private sector organizations are involved in energy sector activities in Brazil. The project Team has held discussions with key officials from a number of organizations. The following are the most key organizations including those involved in energy efficiency activities.:

- The Ministry of Mines and Energy (MME)
- Secretariat of Energy (SEN),
- National Energy Policy Council (NEPC)
- National Agency for Electric Power (ANEEL) and selected state regulatory agencies
- MME's Centers of Excellence in Regulation of Energy Markets
- (Centros de Excelência em Regulação de Mercados de Energia - CERME)
- National Program for Electrical Energy Conservation (PROCEL)
- National Center for Power Research (CEPEL)
- National Energy Development Program for States and Municipalities (PRODEEM)
- Investor and Public Owned Power Utilities (Concessionaires)
- Brazilian National Bank of Economic and Social Development (BNDES) and other selected development and commercial banks

A brief description of the key functions of these organizations follows.

1. The Ministry of Mines and Energy (MME), Secretariat of Energy (SEN), National Energy Policy Council (NEPC)

The Ministry of Mines and Energy (MME) is the Government of Brazil's (GOB) executive branch agency responsible for energy infrastructure in the country. Under Brazil's constitution, the provision of electric power is an obligation that the GOB takes on and guarantees to the people of Brazil. The provision of electric power by non-GOB entities is a new phenomenon and requires the granting of a concession by the GOB to an electric power provider. MME supervises and controls the development of energy resources and monitors all activities related to the power sector. MME is responsible for energy policy, as well as the quality and reliability of energy services and infrastructure necessary for Brazil's economic growth. MME is also responsible for how Brazil positions itself in Climate Change related issues insofar as it relates to the energy sector, counseling and consulting with the Brazilian Ministry of Foreign Affairs on Brazil's international position on GHG and Climate Change.

The Secretariat of Energy (SEN) carries the Minister's delegated responsibilities in these areas with regard to the energy sector. MME and SEN currently lack much of the needed structure to manage such a process adequately, and are creating the National Energy Policy Council (NEPC). The soon-to-be implemented NEPC will deal with macro-energy policies, including division of federal/state responsibilities. The committee will include a wide range of ministries representatives and be chaired by MME. SEN will be NEPC's executive secretariat. The key role of both SEN and NEPC is to establish a coordinated policy framework for Brazil's energy resources and to advise on aspects relating to the energy sector. Specific responsibilities of MME/NEPC/SEN with regard to the restructured electricity sector will be as follows:

- Formulate policies and regulations to implement and disburse national subsidies for rural energy development;
- Provide input to the Ministry of Environment in establishing environmental policy for the sector;
- Establish policy on electricity conservation (implemented through regulation and sponsored projects);
- Sit on the governing bodies of Federal Holding, Sector Financing, Indicative Planning, Independent System Operators, and Sector Services organizations;
- Propose changes in sector legislation for approval by the Congress;
- Nominate the Board of Directors of ANEEL for approval by Congress;
- Nominate directors for the Federal Holding, Sector Financing and Indicative Planning organizations; and
- Exercise ownership functions for federal shareholdings on behalf of the Ministry of Finance.

Traditionally, SEN and other parts of MME have been staffed with officials seconded from Eletrobrás, Brazil's national utility holding company. There is a critical need to strengthen the policy-making function within SEN and NEPC, so that these organizations can become operational and exercise their respective roles without support from Eletrobrás. Sector privatization and the importance of distinguishing the government's roles as policy maker, regulator, and owner of those elements of the industry that will not be privatized, mean that MME's capability as a policy maker need to be strengthened by providing additional skilled and qualifies staff and managers As part of its strategy, the USAID Mission intends to assist MME, SEN, and NEPC as it increases the number of specialist staff by providing specific training and an energy advisor on sector policy issues, focusing on clean energy.

2. National Agency for Electric Power (ANEEL) and Selected State Regulatory Agencies

The Agência Nacional de Energia Elétrica (ANEEL), or National Agency for Electric Power, is the recently established Federal Power Regulatory Agency. The closest U.S. parallel to the structure of ANEEL is the Federal Energy Regulatory Commission (FERC) in the U.S.. Relying on the structure of the previous organization, DNAEE, or National Department of Electric Energy, a now-extinct MME department, ANEEL started to function in December 1997. ANEEL is establishing the regulatory regime necessary to provide the right signals to the market to support the national energy policies promulgated by NEPC.

ANEEL regulates the power sector, sets guidelines for tariffs and rate-making, approves tariffs, and has the authority to grant concessions to service providers (i.e., concessionaires, permissionaires, retailers, independent power producers, and self producers). Such an authority resembles a licensing or authorization power to grant a private agent the right to use a public commodity (like water in a river) to generate, transmit, or distribute power. The licenses may be granted to all parties interested in the power sector (e.g., transmission companies, distribution companies, and retailers). ANEEL is also charged with establishing competition among the actors, as well as reliability and cost effectiveness of service, including service to rural areas. ANEEL's other mandates include a gradual decentralization of regulatory authority to existing and newly established State public utility commissions based on their current capacity and capability to be able to perform the new functions. In addition, ANEEL is responsible for monitoring the public and the newly privatized distribution utilities on the proper and effective use and reporting of the one percent energy efficiency levy discussed earlier.

As has been seen in various Brazilian states (Ceará, Rio Grande do Sul, Rio de Janeiro, São Paulo and Bahia) once state regulatory agencies are established, they require

intense technical advisory services in order to ensure long-lasting and effective performance. There is a great need for technical assistance and training in strengthening existing state regulatory agencies and establishing new state regulatory agencies, as well as in providing requisite technical support to state regulators and their staff. Ideally, regulatory advisory assistance could be established where two or three agencies could be the focus of such assistance. This combined approach would consider individual advisory assistance at the state level, but would also provide joint training and advisory assistance where regulators and staff from different states could meet and share their experiences, concerns, and solutions.

3. MME's Centers of Excellence in Regulation of Energy Markets (Centros de Excelência em Regulação de Mercados de Energia - CERME)

In a country with continental dimensions as Brazil, decentralization is essential. MME understands that this process will have to start with the decentralization of knowledge and human capacity. Under a Memorandum of Understanding (MOU) with selected Federal Universities (Brasilia, São Paulo, Rio de Janeiro, Bahia, Rio Grande do Sul, etc.), MME (through a mix of GOB, World Bank, and IDB funds) is providing the means to develop regulatory research centers in Brazil to disseminate knowledge on utility regulation. Different levels of training and research will be carried out to provide SEN, NEPC, ANEEL, State public utility commissions, power utilities, and others with the requisite institutional capacity for developing and implementing power sector policy and regulations. These activities will be funded for five years when it is expected that universities and associated research centers will reach self sustainability. Both MME and the Center of Excellence (headquartered in Brasilia) have requested USAID assistance to develop and disseminate information on clean and efficient energy production use.

4. National Program for Electrical Energy Conservation (PROCEL)

PROCEL is MME's preferred arm for the design and implementation of the country's program for energy efficiency. Although, officially PROCEL falls under the responsibility of MME, in practice, Eletrobrás runs the program through PROCEL's Executive Secretariat in Eletrobrás headquarters in Rio de Janeiro. In the coming months, PROCEL may merge with Brazil's Electric Power Research Center (CEPEL) to form a research and technical institution reporting directly to SEN/NCEP. PROCEL has been quite successful in achieving its goals and also in coordinating actions with bilateral and multilateral agencies and donors such as CIDA, the World Bank, the European Community (ALURE Program), and the United Nations Development Program (UNDP). PROCEL has confirmed its interest in having USAID assistance for training, seminars and, most importantly, for the implementation and monitoring of the one percent energy levy for energy efficiency. PROCEL is well organized and well connected with all the agents in the power sector (utilities, ESCOs, INEE, ANEEL, Eletrobrás, MME, NGOs, industry, and others).

In general, although PROCEL has capable staff and extensive equipment, it needs assistance in designing and implementing state of the art efficiency programs, as well as monitoring and verification programs to track the success of its programs. The USAID Mission in Brazil has funded an energy efficiency advisor to work with PROCEL, and envisions continuing that assistance, as well as assistance to ANEEL to coordinate the inclusion of energy efficiency into Brazil's new regulatory policy framework. More specifically, PROCEL has requested USAID's assistance in a number of areas as follows:

- To assist PROCEL and ANEEL program the funds resulting from the one percent energy efficiency levy which are to be targeted towards energy efficiency. PROCEL is quite aware that it will have to develop an effective coordination procedure with state regulatory commissions to enforce the one percent energy efficiency mandate on both public and private utilities; and

- To develop effective implementation and evaluation plans for an Energy Efficiency Loan to Brazil, currently under preparation by the World Bank PROCEL is charged with developing the technical proposal to the World Bank, and coordinating the implementation of projects to be funded under the loan.

5. National Center for Power Research (CEPEL)

CEPEL is the equivalent in the U.S. of the Department of Energy's (DOE) national laboratories, and the Electric Power Research Institute (EPRI). Like PROCEL, CEPEL is also operated through Eletrobrás. As noted above, in the coming months CEPEL may merge with PROCEL to form a research and technical organization reporting directly to SEN.

6. National Energy Development Program for States and Municipalities (PRODEEM)

PRODEEM is MME's program for rural off-grid energy services. PRODEEM is governed by an inter-ministerial council, and operated by MME. PRODEEM has representatives or offices in every state of Brazil, and also agreements with state utilities, NGOs and private sector foundations for project identification, design, implementation, and monitoring. It has been successful in implementing "social" residential renewable energy projects (give-away of solar panels and solar water pumps) using federal funds. PRODEEM is now trying to take advantage of the regulatory reforms in Brazil by shifting to a more market-oriented approach, with better monitoring of private-sector participation. It is also expanding its existing agreements for project identification, design, implementation, and monitoring to increase outreach. MME is currently planning to provide support for the establishment of an Executive Secretariat for PRODEEM to more effectively accomplish its transition to a market-based approach.

The Inter-American Development Bank's Sustainable Markets for Sustainable Energy (IDB/SMSE) program is trying to establish an Action Plan with PRODEEM. This is somewhat in parallel with the World Bank's preparation of an integrated commercial/social rural electrification (ICSP) loan for the northeast of Brazil (i.e., the states of Ceará, Bahia, and Minas Gerais). The USAID Mission is providing assistance to PRODEEM through a Policy Advisor based in PRODEEM facilities. This Policy Advisor is assisting PRODEEM in a number of areas including the following:

i. Policy in preparation for PRODEEM's restructuring; and
ii. Institutional contacts with World Bank and IDB/SMSE.

7. Investor and Public Owned Power Utilities (Concessionaires)

USAID has a special interest in three States (Ceará, Bahia and Minas Gerais) that are currently the target states for the World Bank Integrated Commercial/Social Power loan to finance rural decentralized clean power. The utilities in these States are COELCE, COELBA, and CEMIG (Ceará, Bahia and Minas Gerais respectively). COELCE (Ceará) is a state-owned utility and is slated for privatization in 1998-99. COELBA (Bahia) was privatized in 1997. The state government of Minas Gerais sold 51 percent of CEMIG shares in 1997.

As noted above, new private owners of utilities are not particularly interested in investing in rural markets (either extending the grid or servicing consumers by rural decentralized power) because such investments have typically a low return on investment compared to capital investment opportunities. In remote areas, quite often the least cost option for energy services is local generation, usually a clean source such as small hydro, biomass, or residential solar power. State governments are increasingly aware that, in order to integrate the rural population in the development process, they must have a mechanism to provide rural power that is not now readily available from new private utility owners. However, the traditional high cost of rural

services is frequently greater than the capacity of customers to pay for service. Subsidies are unpopular and non-sustainable, and urban consumers generally do not like to pay more for power, allowing the utility to recover their average cost plus a premium. Moreover private utilities are unwilling to accept other service providers in their exclusive concession area. Therefore, while this segment of the market is not attractive because of low investment returns, it also is not exposed to competition as utilities protect their service areas. PRODEEM, the World Bank, and IDB/SMSE are exploring small and micro enterprise approaches to rural service, involving sub-concessions called permissionaires. Through assistance with ANEEL and PRODEEM, USAID plans to work with the World Bank, IDB/SMSE, the utilities, and local entrepreneurs to develop this and other alternative approaches for rural electrification.

8. Brazilian National Bank of Economic and Social Development (BNDES) and Other Selected Development and Commercial Banks

BNDES, the National Economic and Social Development Bank in Brazil, has recently been assigned by the GOB the responsibility to participate in the of financing the power sector (a role that was previously reserved for Eletrobrás). It will have an important role in financing of all forms of infrastructure, including electric power. BNDES will be responsible (with technical guidance from PROCEL, PRODEEM, and others) for on-lending the World Bank's energy efficiency and rural electrification loans for the implementation of viable power projects. Thus, although the exact nature and extent of BNDES' role in power sector finance is still under development, BNDES has indicated interest in receiving assistance from USAID in developing appropriate financing vehicles for clean energy.

The Banco do Nordeste do Brazil (BNB), or Northeast Development Bank, also has an important financing role. BNB has shown itself to be sensitive to rural markets through the implementation of small loans for rural development, including a window for financing small-scale renewable energy projects. Recently BNB has provided half the funds of a partnership between Golden Genesys (a U.S. solar energy firm) and

Fundação Teotonio Vilela (FTV), a Brazilian NGO, to establish a market-oriented micro-finance program in Alagoas and Bahia for residential solar power in the northeast. BNB is interested in working with USAID on developing appropriate financing vehicles for clean energy, including training for extension workers to undertake economic analyses for rural renewable energy systems.

C. SELECTED DONOR ACTIVITIES

One key to the success of the integration of renewable and clean energy practices into the restructuring of Brazil's energy sector will be the coordination and complementarity of USAID programs with those of the other donors active in Brazil. The following is a brief summary of the activities of some of the key bilateral and multi-lateral donors in the energy sector in Brazil.

1. GTZ, Germany

Germany's Gesellschaft für Technische Zusammenarbeit (GTZ) has provided support to Institute for Sustainable Development and Renewable Energy, IDER, an NGO, for the installation of a pilot project involving fifteen photovoltaic (PV) pumping systems in remote villages of the state of Ceará, through a cooperative project the Companhia Energética do Ceará (COELCE) and the State Planning Department.

In the state of Minas Gerais, GTZ also contributes to CEMIG's electrification program -- "Luz de Minas" -- which includes the implementation of a pilot PV program for rural electrification. Under this program, CEMIG provides and installs the stand-alone PV systems in isolated farms, houses, and communities, and provides all the needed maintenance. The initial focus of the Luz de Minas program was to conduct research and development on the deployment of stand-alone PV applications, but the program is now commercially focused, and the costs of the technology and implementation have been considerably reduced over the course of the initial phase of the program.

In another project, the Morro Camelinho wind power station, Brazil's first, came on-line in 1994, co-financed by the state of Minas Gerais and GTZ. The project provided basically free power to the consumers. Unfortunately, the wind quality is only good on the mountain tops, and the population is concentrated in the valleys where there is water access and some protection from the winds, so wind systems for small individual houses has proved rather uneconomical.

2. European Union (EU)

The European Union (EU) has been focusing its development efforts on supporting the Brazilian states during the national energy sector restructuring. Primarily this assistance has been through ALURE, a program for the promotion of energy cooperation, which is structured to have dual Brazilian and EU direction. Initial efforts have involved workshops and regulatory assistance in the state of Bahia through ANEEL. The EU has also been involved in the preparation of feasibility studies for the World Bank energy efficiency loan. Through these activities, the EU hopes to increase European trade in energy technologies. The total aid package by EU has amounted to $3.4 million in the 1997-98 time frame.

The second phase of the EU's program is under development, and is anticipated to involve $5 million in assistance. The EU will form a partnership with COELBA, the state of Bahia's energy utility, to promote renewable energy, especially solar power. This will be accomplished primarily through support of entrepreneurship, dealing with permissionaires.

3. Inter-American Development Bank (IDB)

The Inter-American Development Bank (IDB) has been involved in two separate assistance efforts with the GOB. The first activity involves a $150 million loan to Eletrobrás to support the construction of a north-south power transmission line to connect the north/northeast power grid to the south/southeast grid. This connection will allow 500 kv of optimal power supplies with less seasonal fluctuation, as hydropower generated during the rainy season in one region can be shared with the other region during its dry season. Within this loan, $1.5 million has been designated for institutional capacity building, to be administered through the Independent System Operator, the Independent Planner, and ANEEL. Training activities will require $650,000 for institutional capacity building funds, and the remainder will be used for technical analyses of tariff structuring and free access.

The second focus involves linking IDB's Sustainable Markets for Sustainable energy program with a $400,000,000 small and medium enterprise fund, created for promoting renewable energy entrepreneurship. As PRODEEM undergoes restructuring, the IDB hopes to use these funds to strengthen market-oriented rural renewable energy options in Ceará, Bahia, and Minas Gerais.

4. United Nations Development Program (UNDP)

The United Nations Development Program (UNDP) has been serving as trustee for PROCEL's energy efficiency fund, taking a two-percent administration fee. It is also looking to provide, in cooperation with USAID, a technical advisor to PRODEEM. The advisor will serve as a facilitator and coordinator between UNDP, the World Bank, the IDB, and USAID, to maximize impact of all donor programs.

5. The World Bank

The World Bank is currently developing two loans to support the privatization of the energy sector in Brazil. One loan, which promotes energy efficiency programs, will be funded at a total of $150 million, and will disperse funds through either Eletrobrás or PROCEL to power utilities for energy efficiency projects.

The second loan, called the Integrated Commercial/Social Power loan for the northeast of Brazil, focuses on bringing renewable energy, primarily off-grid solar residential power, to isolated rural communities. Funds will total $100 million, and will be programmed through PRODEEM. USAID was involved in the preparation of three of the five preliminary studies that led to this loan.

III. ENERGY EFFICIENCY

A. CURRENT STATUS

In most developed countries, energy efficiency is often linked to the resultant reductions in carbon dioxide emissions. In developing and newly industrializing countries, during the last two decades, the domestic and worldwide demand for products emphasized production growth at the expense of efficient production, as most export-oriented industries in these countries were subsidized by their respective governments. Energy efficiency was often not emphasized as a profitable business. In 1985, in response to heavy dependence on interruptible imported petroleum, many oil importing countries, including Brazil , shifted their energy strategy to focus on domestic sources of energy and energy efficiency. Brazil created PROCEL as a cell within its national utility, Eletrobras, to begin focusing on energy efficiency as a way to reduce energy consumption per unit of production. Since that time, PROCEL has been very active in promoting efficient use of energy and while there are many success stories, market-based mechanisms to stimulate private sector investment in energy efficiency in Brazil are largely absent.

The GOB has developed an Energy Sector Strategic Plan (Plano 2015) which illustrates the country's strategy for meeting its demand for energy between 1998 and the year 2015. As part of this comprehensive plan, the government has set a long-term goal for PROCEL to reduce the overall consumption of electricity in the country by 11% by the year 2015. As of 1997, the total investment by PROCEL in energy efficiency programs stood at R$76 million or approximately US $75 million, resulting in an avoided investment of R$2.6 billion or US $2.5 billion in new power capacity. Specifically, the PROCEL program included an aggressive publicity campaign, incentives to electrical appliance manufacturers, and other end-use consumers of Eletrobras, parent organization of PROCEL. Virtually all of the funding for the PROCEL initiatives has until recently come from the Eletrobras budget. The PROCEL

program did not address captive power generators, potential for cogeneration in the industrial and commercial sectors, and private sector led energy investments in the form of EPCs and ESCOs. In order to address these energy efficiency opportunities, PROCEL is currently working with the World Bank to secure a loan. In addition, as per new regulations, ANEEL has selected PROCEL to be the executing entity for guiding and monitoring the investments equivalent to 1% of the revenues of the privatized utilities in energy efficiency projects. This amount is equivalent to US $200 million that will be available for new investments. The procedural aspects of managing these revenues and ensuring that they are invested in energy efficiency projects as required by the new law have not been fully addressed. The MMEE project may be able to offer specific recommendations to the GOB based on models used in other countries regarding the ways that these funds could leverage private sector investments in energy efficiency.

The opportunities for energy efficiency exist in both the supply and distribution of electricity as well as at the end use level. The supply side (generation and T&D) is managed by a much smaller number of suppliers/managers and major industrial companies (including those with large captive power systems). These stakeholders are generally more tuned to the market conditions as they understand and appreciate that energy savings can be transformed into profits. Also, many of these large multinational firms operate in the internationally competitive environment where cutting energy losses in their operations directly improves the competitiveness of their products and profitability. In Brazil, most of the large multinational companies continue to be monopolistic and in some cases state-owned. They are very protective of their markets and can often act as inhibitors to market-led investments in energy efficiency at the end-use level.

While the key large enterprise sector represents fewer establishments with total assets exceeding US $200 billion, the end-use sector consists of a large number of users with an estimated investment of US $300 billion. These individual end-users are generally

less informed and more reluctant to implementing end-use energy efficiency. It is this sector that typically requires some form of intervention to facilitate energy efficiency investments. The intervention can take the form of fiscal and financial incentives (The Carrot Approach), regulatory controls and penalties (The Stick Approach), demonstration programs and training, and education and publicity. The end-use sector in Brazil is comprised of a large number of household, commercial, and industrial users of electricity. It is these users for which a targeted program needs to be developed. In addition, the financing requirements for achieving even a fraction of the overall energy efficiency potential are formidable and Eletrobras, the government, the donors, and the privatized utilities cannot alone meet the overall capital demand. Brazil represents a strong case for an economy where market-based energy efficiency investments are the only long-term solution to the investment needs in the energy efficiency sector. In the interim, however, Eletrobras, PROCEL, the donors, and the distribution utilities can meet the critical need for preparing and facilitating market investments in energy efficiency through EPCs and ESCOs.

The commercial and industrial sectors in Brazil have been growing at a rapid pace in recent years. For example, in 1996, the commercial and industrial sector grew at the rates of 5.1% and 5.5% annually respectively. At the sub-sector level, for instance, the automobile production grew by 17% in 1997, whereas the sales of electrical appliances grew at the rate of 22% in the same year. Despite the economic problems, Brazil anticipates continuous growth in both the commercial and industrial sectors, thereby imposing extensive demand for new energy. Another strong indicator of the planned growth in the economy is the planned investment of some US $25 billion in new production capacity by the country's 33 major business groups during the 1998-2001 period, representing an average annual investment in excess of US $6 billion over the next 4 years. The overall investments planned for the power sector during the same period are approximately US $25 billion or US $6 billion in generation and transmission and distribution systems.

In 1997, the electricity consumption in Brazil was 6.5% higher than in 1996. Based on data compiled by Eletrobras, the industrial sector comprised the largest share of the overall growth (45%). The household sector and the commercial sectors were the next largest consumers of electricity at 27% and 135 respectively of the total consumption. Together, the industrial, commercial and public sectors consume approximately 72% of the total electricity and offer the best prospects for energy efficiency gains.

Within the commercial sector, the key energy consumers are super markets, department stores, and appliance and general stores. Of these, the super markets represent approximately 70% of the total sales and are excellent candidates for implementation of energy efficiency programs. In the service sector, comprising of hospitals, hotels, and water sanitation companies, the hospitals and hotels are major consumers of electricity and appear to be the best prospects for energy efficiency.

As these statistics indicate, industry is (i) the largest consumer of energy, (ii) offers the greatest promise of economical energy savings, and (iii) presents the best opportunity for reducing emissions. As the Brazilian economy continues to have an industry-led growth the share of electricity-based production is going to grow. Therefore, industry will become an increasingly larger contributor of carbon dioxide. At the same time, it will also require a much larger share of the overall investments available for energy efficiency. As can be seen industry offers the best prospect for both reduction in carbon dioxide emissions as well as sizeable energy savings opportunities.

Although, sporadically, different donor groups, consultants, and NGOs have developed estimates for the potential of energy savings at the sub-sector level (chemicals, hotels, paper and pulp, etc.), there is no comprehensive assessment of the overall potential for energy savings in the entire industry in Brazil. However, given the current operating characteristics of Brazilian companies, conservatively, one could expect that at least 15% of total energy could be economically saved even at current electricity prices. As the prices of electricity increase, as expected as a result of privatization, the overall

potential for electricity savings could go up significantly in the medium to long term. In addition, given the high cost of captive power generation a significant potential also exists for industrial cogeneration which is now permitted under Brazilian law..

In the commercial sector, comprising of shopping centers, apartment buildings, hotels, office buildings, and hospitals, the opportunities for energy savings are also similar to those in the industrial sector. However, this potential is far from being realized. There are no systematic energy audits of these buildings and the equipment and technology, in most cases is outdated. Other reasons for a lack of energy savings include: a lack of preventive maintenance program, inadequate or little financing, a lack of importance attached to energy as cost of overall operations, etc.

Notwithstanding the potential opportunities for energy savings, the main reason for a lack of energy savings investments continues to be the absence of a knowledge base. Most end-users, especially the small and medium size users are simply not aware of the benefits of energy efficiency. Accordingly, there is little monitoring of energy use in most factories and establishments.

The situation in the household sector is no different. In fact, the awareness of energy savings potential is the lowest in this sector and so is the incentive to invest in purchasing energy efficient appliances as this sector by and large pays the lowest electricity tariffs. Nonetheless, the household sector also represents significant opportunities for energy savings. Eletrobras, through utility-sponsored programs, has made considerable headway in this sector. However, a significant potential for additional energy savings continues to exist in this sector as well.

The key to realizing the energy savings potential at the end-use level in Brazil will eventually have to include (i) market-based investments in energy efficiency projects and (ii) availability of attractive financing for ESCOs and other energy service companies to convince themselves regarding the profitability of energy efficiency

services as a profitable business. The current process of structural reform in the energy sector in Brazil will pave the way for the development of ESCOs as a powerful tool for market-based energy efficiency services.

B. REGULATORY CLIMATE

Given the recent increases in the price of electricity, not only the utilities but the consumer is beginning to develop an interest in energy savings. The utility-sponsored DSM programs in Brazil focus on peak period load management and public lighting where tariffs are below cost. As a result, the GOB has shifted its policy to allow the consumer a greater voice in the development of a market-based energy efficiency industry.

The privatization of the power sector has already resulted in the sale of several distribution utilities, with many more for privatization in 1999 and 2,000. In addition, the mandatory requirement for all utilities to invest 1% of their total revenues in energy efficiency projects has opened the way for utility-sponsored energy efficiency investments throughout the country. The new law permits private power generation, private industrial cogeneration, and concessions for SPUs. Although, a number of rule-making and procedural issues need to be fully formulated, Brazil has taken a bold step toward opening all stages of the power sector (generation, transmission, distribution, wholesale, etc.) for private participation. Undoubtedly, as the experience in other countries demonstrates, this will lead to a more efficient electric power sector in country. It will, however, also lead to higher energy prices as the new prices must be consistent with production costs and the profit margins of private power developers and distributors.

From the standpoint of energy efficiency, in an open power market with higher energy prices, ESCOs are the ideal vehicles to facilitate market-led investment in energy efficiency investments. In addition, the banking sector in Brazil is also beginning to

realize that financing of energy efficiency projects could prove to be a sizeable market in the near term. BNDES, the largest development bank in Brazil has established a new cell with the specific responsibility to develop a new portfolio and strategy for the bank to cater to this emerging market for capital. Other development banks such as the BNB in Northeast of Brazil have also shown a great deal of interest in financing energy efficiency projects. However, some of these institutions are not familiar with the process of packaging and evaluating energy efficiency projects which are typically small and are not considered attractive by the financing institutions because of their large transaction costs relative to their sizes. While the prevailing banking regulations do not prevent the local banks to undertake financing of energy efficiency projects, bank policies have typically dictated financing of large relatively risk free investments and relending on loans financed by the World bank and IDB. The other area of extensive business of these banks is relending on high interest, short-term overdraft protection type loans through local commercial banks. The banking climate, however, is changing in response to the new demand for capital for energy efficiency projects. BNDES is taking a lead in this area.

Industrial cogeneration. is also becoming an attractive market in Brazil. Discussions with FIESP, the Federation of Industries in Sao Paulo, the largest industry association in Brazil, indicate that a large number of their members are now looking at possible gas-fired cogeneration systems. Once again, the privatization Law in Brazil has cleared the way for promoting cogeneration whereby the local cogenerators and utilities can enter into contracts for supply of excess electricity to the utility grids at pre-negotiated prices. A number of discussions are underway between large industries and BNDES for financing of cogeneration systems in the range of 10-25 MW.

Based on the Project Team's review of the current regulatory climate in Brazil, it appears that there are no major regulatory impediments to the implementation of energy efficiency, industrial cogeneration and IPP projects in the country. However, Brazil does not have much experience with the process of granting licenses to cogenerators

and concessions to IPPs. In addition, as the regulatory authority is transferred from ANEEL, the federal regulator to state-level utility regulators, one would expect certain procedural and jurisdictional issues that may slow down the permitting and licensing process. Under technical assistance from USAID and the World Bank, ANEEL is currently engaged in developing the procedures for transition of regulatory authority to the states with the assistance of PricewaterhouseCooper.

C. KEY IN-COUNTRY PARTNERS AND STAKEHOLDERS

As mentioned earlier, a large number of federal government agencies, state government agencies, private industries, industry associations, research organizations, universities, NGOs, donor agencies, donor-supported groups, development banks, etc. are involved in different aspects of the energy sector in Brazil. With respect to energy efficiency, a number of partners and stakeholders will have a great role and our Project Team has begun discussions with a number of them to develop a strategic partnership in order to (i) conduct a highly visible and successful ESCO workshop and (ii) ensure some level of sustainability after the MMEE project is completed.

The success of this project in Brazil will require the support of and endorsement from a number of key organizations in Brazil. Within the government/utility sector, the following agencies will be co-opted in some form in order to make the ESCO workshop successful:

- The Ministry of Mines and Energy (MME)
- Secretariat of Energy (SEN),
- National Energy Policy Council (NEPC)
- National Agency for Electric Power (ANEEL) and selected state regulatory agencies
- MME's Centers of Excellence in Regulation of Energy Markets (Centros de Excelência em Regulação de Mercados de Energia - CERME)

- Selected major electric utilities, particularly those in Rio de Janeiro and Sao Paulo

In addition, a number of government and donor supported organizations will have a major stake in the stimulation of private sector led energy efficiency market. The Bechtel Project Team is closely working with many of these entities, especially including the following:

- National Program for Electrical Energy Conservation (PROCEL)
- National Center for Power Research (CEPEL)
- National Energy Development Program for States and Municipalities (PRODEEM)

Other stakeholders/partners will include key financial sector institutions. Two of the key financial institutions with a strong stated interest in energy efficiency are as follows:

- Brazilian National Bank of Economic and Social Development (BNDES)
- The Northeastern Bank of Brazil -- Banco do Nordeste -- (BNB)

Other regional banks will also be identified as potential partners for USAID-sponsored activities in area of energy efficiency well beyond the MMEE project.

A number of industry associations, research organizations and non-profit foundations will also have a major role to play in the MMEE project. Some of the most noteworthy organizations already selected by the project Team include the following:

- Fundacao Brasileira Para O Desenvolvimento Sustentavel (FBDS), a non-profit environmental foundation engaged in climate change research and policy formulation

- Instituto Nacional De Eficiencia Energia (INEE), a leading private sector non-profit organization exclusively devoted to energy efficiency and its linkage with GCC

- Associacao Brasileira das Empresas de Servicos de Conservacao de Energia, (ABESCO), the Association of Brazilian Energy Service Companies

- Associacao Brasileira da Industria de Iluminacao (ABILUX), the Brazilain Association of Lighting Industry

- International Energy Initiative, a consulting firm in energy efficiency

- Federacao das Industrias do Estado de sao Paulo (FIESP), the largest Industry association in Brazil, located in Sao Paulo

While the above represents a fairly comprehensive list of potential partners and stakeholders in any activity addressing energy efficiency in Brazil, including the USAID-funded MMEE Project, clearly as the project Team approaches the timing of the proposed ESCO Workshop in Brazil, more interested partners/stakeholders will surface and will be involved in the project.

IV. ENERGY EFFICIENCY MARKET POTENTIAL

There is no comprehensive and systematic assessment of the overall market for energy efficiency and the opportunities for ESCOs in the Brazilian economy. In early 1998, PROCEL, with support from the European Union sponsored ALURE Program, engaged a local consultant to develop preliminary estimates for the magnitude of the market for energy efficiency in different sectors of the Brazilian economy. Based on the consultant's findings and analysis, PROCEL issued a report -- "Estimated Market for Energy Service Companies in Brazil" -- in April 1998. The report focussed on energy consumers in the, commercial, industrial, and public sectors as those representing the potential market of ESCOs.

Some of the key findings of this report as relevant to the MMEE project are summarized below.

A. COMMERCIAL SECTOR

The commercial sector market segments included shopping centers, super markets, hotels, and hospitals. The consultant examined the market for energy savings in the lighting, air conditioning, and cogeneration areas within these energy consuming sub-sectors. The consultant estimated the overall energy savings, the required investments, and the monetary value of the energy savings potential. The following summary highlights the market potential for new energy performance contracts (EPCs) in the commercial sector in Brazil.

- In the area of lighting and air conditioning, the study included 72 shopping centers, 860 supermarkets, 850 hotels, and 169 hospitals throughout Brazil. Based on potential for energy savings potential in typical establishments, the report estimated the total potential for annual energy savings to be 2,609 GWh or approximately 30 percent of the current energy consumption in these establishments. The total monetary value of the estimated energy savings is US $110.5 million, at an investment of US $285.6 million.

- The typical investments per unit needed to realize the potential energy savings were estimated to be US $180,000 per shopping center, US $80,000 per super market, US $200,000 per hotel, and US $200,000 per hospital, on an average. The typical per unit value of annual energy savings was estimated to be US $73,000 per shopping center, US $32,000 per super market, US $73,000 per hotel, and US $73,000 per hospital, on an average.

- For estimating the potential for energy cogeneration, the report selected 22 shopping centers, 103 hotels, and 85 hospitals as the best prospects in the country for implementing economic cogeneration systems. For these establishments, the report estimates the total annual energy savings value to be US $21.5 million for shopping centers, US $62 million for hotels, and US $51 million for hospitals. The total investments required to achieve these savings through cogeneration are estimated to be US $86 million for shopping centers, US $309 million for hotels, and US $255 million for hospitals. This represents the total value of the energy savings to be US $134.5 million per year at an overall investment of US $650 million in new cogeneration systems, or a simple payback period of 4.8 years.

B. THE PUBLIC SECTOR

The PROCEL study included basic sanitation facilities and public lighting as part of this sector in its analysis of the potential for energy savings. Public buildings could not be included as part of the study due to a lack of consistent information. However, it should be noted that public buildings represent a very promising sector for energy efficiency investments and in fact some of early demonstration candidates may very likely come from the public buildings. The report's key findings are as follows:

- The total amount of electricity consumed per year in the public sanitation facilities and public lighting sub-sector is 17.750 GWh. The report estimates that as much as 4.020 GWh or 22.6 percent of the total energy can be saved annually in this sector through simple, high payback investments

- The monetary value of the potential energy savings is estimated to be US $239.2 million per year at an investment of US $419.8 million, representing a simple payback period of 1.75 years or the simple rate of return to be close to 50 percent per year.

As can be seen, this sector offers the most attractive opportunities for EPCs to private ESCOs

C. INDUSTRIAL SECTOR

In the industrial sector, the report included only the best prospect candidates in various sub-sectors. Specifically, the study included: 17 non-ferrous metals companies, 11 chemicals companies, 36 steel companies, 33 food and beverages companies, 19 paper and pulp companies, 8 iron alloys companies, 14 textile companies, 20 ceramic companies, and 9 cement companies for the assessment of the potential for energy savings. The study did not include many small and medium size companies as at current prices, the overall likely potential for energy savings is estimated to be near 10 percent, based on a 1996 study carried out by the Sebrae -- Small and Micro Enterprise Support Service. Clearly, this segment of the industrial sector will offer a much greater potential for energy savings in the medium term as the prices for electricity are rationalized in a more predominantly private power market.

The industry sub-sectors selected for the study together consume approximately 48 percent of the total electricity consumption in the industrial sector. For each of the sub-sectors, the study considered specific energy efficiency measures. While these measures differed somewhat from sub-sector to sub-sector, the most common measures to all of the sub-sectors included: maintenance, implementation of variable speed operating systems, retrofit of motors and engines, gas injection in induction type motors, control systems, and furnace optimizations.

Based on specific assumptions regarding the current state of the Brazilian industry and the typical practices in similar facilities in developed countries with highly efficient industry operations, the report estimated the potential for energy savings within each of the sub-sectors. The results of the report are summarized below.

- In the non-ferrous metals industry, the report estimates the total value of potential energy savings to be US $13.2 million per year at a total investment of US $21.2 million, representing an average simple payback period of 1.6 years. The actual payback period varies between 4 and 24 months depending upon the energy efficiency measure. However, all energy efficiency measures yield a simple payback period of less than 2 years.

- In the chemical industry, the potential for energy efficiency has been estimated to be in the range of 10-12 percent of total electricity consumption. For the 11 companies included in the PROCEL study, the report estimates that this saving can be achieved at an investment of US $101 million with an average payback period of 2-3 years. The largest savings result from the implementation of cogeneration which also requires the lion's share of the total investment (US $48 million out of US $101 million).

- In the steel industry, the report estimates that the total energy savings could reach approximately 12 percent of the current electricity consumption. The investment requirement for implementing key energy efficiency measures including gas-fired cogeneration is estimated to be US $96 million, with an average simple payback period of 3-4 years. Of this amount, an estimated US $63 million will be needed for new gas-fired cogeneration systems. The second largest investment (US $14.7 million) is needed for the installation of automatic control systems.

- In the food and beverages sector, the report estimates the total savings to be in order of 11 percent of the current electricity consumption annually, estimated to be worth US $19.4 million per year at an investment of US $33 million. This offers a simple average payback period of 1.7 years. The largest investment is required for the overall and reform of the internal distribution systems, estimated to be US $14 million.

- The next sector studied in the report was the paper and pulp sector. In this sector, the study has estimated the potential for energy savings to be approximately 5.7 percent of the total electricity consumption. These savings are estimated to be worth US $15.8 million per year at a total estimated investment of US $41.3 million. The largest investment (US $31.8 million) is required for the installation of new cogeneration systems.

- In the iron and steel industry, the report estimates the total electricity savings potential to be approximately 6 percent of the total electricity consumption. The monetary value of the savings is estimated to be US $14 million annually at an estimated investment of US $42 million, representing an average simple payback period of 3 years. Once again the largest

investment (US $20.8 million) is needed for the implementation of exhaust gas based cogeneration systems.

- The textile industry offers the most promising sector for fast payback energy efficiency investments. The report estimates that the potential for near-term electricity savings is approximately 6 percent of the total electricity consumption. These savings can be realized at a total investment of US $7 million and represent the monetary value of the savings to be US $4.3 million, yielding an average simple payback period of less than two years.

- In the ceramics industry, the potential for electricity savings is estimated to be 11.2 percent over the current level of electricity consumption. The monetary value of these savings is estimated to be US $3.2 million annually requiring an investment of US $5.9 million.

- The last sector included in the study was the cement sector. The report estimates the overall near-term potential for energy savings to be in the range of 7.3 percent of the current levels of consumption. For the firms included in the study, this amounts to an annual saving of US $4.2 million annually at an estimated investment of US $7.2 million. These investments represent an average simple payback period of 1.7 years.

As the above analysis indicates, the potential for energy savings in the industry in the near term varies in the range of 6-13 percent per year and the payback period for the required investments in less than 4 years, and less than 2 years in most cases. Therefore, this offers an attractive market for ESCOs even under the prevailing electricity prices. This market is expected to grow significantly as additional investments become attractive in market-based electric power supply system.

It should be noted that the overall market for industrial cogeneration in Brazil is expected to be many fold compared to the market represented in the PROCEL study. For example, the pharmaceutical and petrochemical companies, not included in the study, are extremely energy intensive industries and offer a sizeable market for industrial cogeneration. Together, these two sectors could represent an additional market for energy investments in the range of US $1.2 billion with average payback, in most cases, of less than 4 years.

V. KEY BARRIERS TO ENERGY EFFICIENCY

Many of the technologies for energy efficiency are well established and are in wide-scale commercial use in most of the developed economies. However, as experience confirms, the adaptation of these technologies in the developing and newly industrialized countries has lagged significantly behind the economic opportunities they represent for energy efficiency, reduction in production cost, enhanced competitiveness, and overall increase in industrial and commercial productivity. While there are no technological constraints to the implementation of energy efficient technologies, other than misplaced perceptions among some planners and industry decision makers, a large number of barriers continue to limit the implementation of energy efficiency. As a result, despite significant benefits of energy efficiency to facility owners and to society, there has been relatively little implementation of energy efficiency options by customers, utilities and governments in developing countries.

The barriers to implementation include real or perceived economic and financial constraints, social and psychological perceptions, lack of effective demonstration and outreach programs, and policies that have limited effectiveness in achieving the needed market transformation and private sector participation. There has been a great deal of effort devoted to estimating energy efficiency potential, identifying barriers to implementation, and developing policy actions to overcome them, but there have been few results in terms of actual market implementation.

The energy service companies (ESCOs), while quite successful in developed economies, are far from common in the developing countries. In Brazil, the ESCO industry is very undeveloped. The practice of energy performance contracting is virtually non-existent in the country. Some of the major constraints to the development of ESCOs in Brazil include the following:

- Skeptical customers and third party financial institutions in energy efficiency performance contracting

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- A lack of successful performance contracts or success stories that could serve as models for the industry

- A severe lack of venture capital for ESCO development and, until recently, a lack of interest among the major financial institutions to consider financing either the ESCOs or private energy efficiency investments.

- A lack of incentives to utilities in the monopolistic power market to either support the establishment of or the use of ESCOs for end-use efficiency investments

- A lack of trained energy auditors and certified energy efficiency firms resulting in the customers' inability to judge quality and make decision.

Among the various barriers mentioned above, the most formidable barriers in Brazil continue to be (i) a lack of financing for energy efficiency projects, (ii) the prevailing electricity tariffs which need to be rationalized, and (iii) a lack of demonstration of the significant benefits of energy efficiency performance contracting and ESCOs.

In response to these barriers, the GOB has recently developed new policy initiatives aimed at developing an energy efficiency industry. One of the first actions taken by the government is to utilize local ESCOs to implement energy efficiency measures in public buildings through performance contracting. In addition to the benefits of energy savings, this program will also be used by the GOB to widely publicize the benefits of ESCOs to the energy consumers throughout the country. This GOB initiative will be supported through a grant from the Global Environment Facility (GEF) and a loan in the amount of US $150 million from the World Bank. Both of these financing mechanisms should be fully operational soon. A major component of these programs is to fund targeted ESCO demonstration projects in Brazil.

In addition, a number of on-going initiatives by others in the donor community (CIDA of Canada, EU' ALURE program, U.S. Department of Energy, etc.) are providing assistance for the development of the ESCO industry in Brazil to focus on the institutional buildings, an energy efficiency approach similar to the Institutional

Conservation Program (aimed at schools, hospitals, and public buildings and implemented by US DOE in the late 1970s).

In addition to the public buildings programs, the government needs to implement an active policy to promote ESCOs through EPCs in the commercial and industrial sectors. Specifically, there is a need to demonstrate the win-win aspect of EPCs in that the ESCOs guarantee the performance and the customer takes no risk. In particular, the best way to overcome the perceived and real barriers to investments in energy efficiency is to demonstrate to the facility owners the major benefits of an EPC approach taken by the ESCOs, including the following benefits:

- The facility owner/operator does not need to make any up front investments as the energy efficiency improvements are financed by the energy savings throughout the duration of the EPC.
- The measures result in lower operating costs, improved productivity, and higher profits with no risk to the facility owner.
- The facility owner is able to achieve improved energy services (e.g., better lighting, greater HVAC comfort, etc.).
- A value added in terms of greater awareness of energy efficiency benefits among the facility workers.
- Little or no burden on the facility management as the responsibility for implementing the EPC is on the ESCOs.

The MMEE project is designed precisely to focus on removing the barriers and demonstrating the benefits of ESCOs.

VI. STRATEGY FOR DESIGNING COUNTRY WORKSHOP

Despite (i) a relatively large potential for energy savings in the public, commercial, and industrial sectors in Brazil and (ii) the indications of a large potential market for ESCO development, the effective initial mobilization and future growth the ESCOs in the country would require a strategic approach to addressing the business infrastructure and capacity building needs. In particularly, a number of simultaneous activities will be needed as follows:

- Strategic alliances will need to be built among partners from the public sector, energy consumers, ESCOs, and foreign partners
- Extensive training will be required for both energy consumers (buyers of ESCO services) and ESCO engineers and technicians
- State and local officials in the health, education, and other public sector operations will need to be educated in the value of using EPCs offered by ESCOs for implementing energy efficiency projects in public buildings
- A comprehensive program for the certification of trained energy auditors, building engineers, boiler retrofit, etc. will need to be instituted to build the local capacity of the ESCO industry
- The financial community, especially the small and medium size commercial banks will need to brought on board with respect to financing ESCOs. This will also require training and demonstrations to remove the perceptional risks of small-scale investment in energy efficiency projects.
- At the higher end of the investment requirements (e.g., for industrial cogeneration projects), the Brazilian industrialists as well as financiers will need to learn the benefits of cogeneration in terms of direct increase in profitability.

The USAID-funded MMEE project plans to conduct a workshop in Brazil to focus on most of these needs. The project will act as a catalyst to induce the Brazilian market to appreciate the benefits of ESCOs.

A. WORKSHOP MATERIAL

The proposed ESCO workshop in Brazil will include technical papers, background on successful ESCO projects, individual work group exercises, and sharing of relevant information in order to stimulate the Brazilian market to take an aggressive approach to developing an ESCO industry.

As part of the pre-workshop preparation, the project Team will prepare extensive resource materials targeted to specific stakeholders in Brazil. The primary stakeholders and participants in workshop will include the following:

- Government policy-makers and regulators
- Financial institutions
- Private sector organizations participating in the delivery of energy services, including energy service companies (ESCOs)
- End users of energy

The resource materials will include a "decision model" or value chain for implementation of energy efficiency services, examples and case studies of "best practices" related to energy efficiency service delivery, and guidebooks and toolkits targeted at the specific audiences. Illustrative examples of the type of information include the following:

For Government Policy-makers and Regulators

- Examples of policy initiatives promoting energy efficiency
- Successful legislation (including codes and standards) for energy efficiency
- Examples of regulatory initiatives to promote energy efficiency
- Examples of initiatives to facilitate ESCO formation
- Examples of quasi-public organizations and their roles in EE implementation
- Examples of government procurement policies and other initiatives to demonstrate successful implementation

For Financial Institutions

- Typical financing options and agreements
- Examples of successful financing of private sector EE projects
- Typical project cash flows and returns
- Definition of financial risks and risk mitigation techniques
- Guidelines for evaluating EE projects

For Private sector organizations

- Directory of International ESCOs
- Directory of financing sources
- Examples and case studies of successful projects
- Guidelines for developing bankable projects
- Guidebook for establishment and operation of a successful ESCO (describing best practices for organizational, sales, marketing, contracting, operational and risk management functions)
- Measurement and verification approaches and methods

For End Users

- Guidebook on ESCO services
- Typical contracts and agreements
- Case studies of successful projects and best practices
- Directory of information sources on EE technologies

Specifically, the workshop will be structured to maximizing the potential for achieving the following types of results:

- Adoption of new energy efficiency policies/regulations
- Leveraging of public and private sector investment
- Establishment of energy service companies (ESCOs) and facilitating energy services performance contracting (EPC) projects
- Establishment and/or mobilization of local industry associations or NGOs to facilitate EE implementation
- Leveraging of additional MDB and other donor agency lending for energy efficiency
- Adoption of improved EE operating policies/procedures
- Demonstration of business-based solutions

The ultimate objective of the workshop will be toward initiating and/or facilitating specific activities to develop and implement strategies for establishing the needed policy

and regulatory initiatives, developing the needed implementation infrastructure, creating the appropriate financial institutions and instruments, and motivating the private sector to actively participate in the delivery of energy efficiency services. The workshop shall present the strategic framework and supporting resource materials developed under the MMEE Project, and identify and demonstrate how these can best be utilized to facilitate the implementation of energy efficiency activities and the development and growth of an energy efficiency services industry in Brazil.

B. PARTNERS, SPONSORS, AND PARTICIPANTS

In order for the workshop to be successful, the Project Team will need local partners and sponsors of the workshop. We propose to invite National Institute for Energy Efficiency (INEE), International Energy Initiatives (IEI), the Brazilian Foundation for Sustainable Development (FBDS), and the Brazilian Association of Energy Services Companies (ABESCO) to join the Project Team to assist in (i) preparation of selected workshop material, (ii) some local logistics arrangements, and (iii) assistance during the workshop both for logistics as well as the presentation of selected material to the participants. These organizations will expect to be reimbursed for their costs for participating in the workshop and will be included as part of CORE International's support to the Bechtel Team. The Project Team has held preliminary discussions with representatives of these organizations for their participation. All of them have expressed their willingness to be a member of the Team. However, the arrangements have not been finalized yet.

In order to achieve a significant buy-in and a wide-scale visibility for the workshop, the Project Team plans to solicit institutional co-sponsorship by key organizations in Brazil to support the USAID-funded MMEE Project. The Team proposes to solicit the following public and private organizations:

- Ministry of Mines and Energy

- University of Brasilia (CERME)
- National Social and Economic Development Bank of Brazil (BNDES)
- Federation of Industry in the State of Sao Paulo (FIESP)
- National Organization for Energy Efficiency (PROCEL)
- U.S. Chamber of Commerce in Brazil

There may be other organizations that may also be important to include as co-sponsors. For example, the World Bank, IDB, a regional development bank in Brazil, perhaps one or two newly privatized utilities, etc. may also wish to offer sponsorship for the USAID-MMEE Project Workshop. The Project Team has already discussed with many of these organizations their potential involvement as co-sponsors but has not finalized any arrangements.

The workshop will be planned for a duration of three to four days. Given the diverse energy and institutional sector in Brazil, it is anticipated that approximately 150 participants from many Brazilian organizations will participate in the workshop. The Project Team has identified the following organizations that will be represented in the workshop either as participants or as presenters of materials:

- Government policy-makers from MME, ANEEL and other ministries
- Regulators (ANEEL, CSPE in Sao Paulo)
- USAID Mission in Brasilia
- Multilateral financing organizations (The World Bank, IDB, EU)
- Bilateral donor organizations (US TDA, GTZ, CIDA, etc.)
- Utilities (Eletrobras, several state and municipal utilities)
- Major energy users (to be identified)
- Consumer groups (to be identified)
- Local energy efficiency service providers (members of ABESCO)

- Entrepreneurs interested in establishing local energy services businesses (e.g., Proven Alternatives of Brazil, and others)
- Energy efficiency equipment manufacturers and suppliers (Johnson Controls, members of ABILUX, Honeywell, etc.)
- Design and engineering firms (to be identified)
- Contractors and installers (to be identified)
- Local non-government organizations (to be identified)
- Development financing institutions (e.g., BNDES, BNB)
- Private sector financing organizations (to be identified)
- Other interested organizations (to be identified)

The planning for the workshop will need to begin soon in order to firm up all the agreements and reserve the space.

ANNEX I: KEY CONTACTS IN BRAZIL

The Bechtel Project Team representatives held discussions with a number of individuals during the October 19-24 mission to Brazil. A list of contact information for these individuals follows:

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In an earlier mission to Brazil as a TAG member, Vinod Shrivastava, CORE International, Inc., a member of the Bechtel Project Team, visited Brazil for two weeks and assisted the USAID Mission in the formulation of the Mission's overall strategy. During this filed mission, the TAG Team visited many more key energy sector officials in addition to those listed above. The mission traveled to several cities in Brazil (Rio de Janeiro, Sao Paulo, Brasilia, and Salvador). A complete list of officials visited by the mission follows:

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ANNEX II: ENERGY SECTOR HIGHLIGHTS IN BRAZIL

The USAID Mission has prepared a presentation of the highlights of the energy sector in Brazil. In June 1998, the Energy Advisor from the Mission made a presentation to the Global Bureau and other USAID officials. The Bechtel project Team has received a copy of this presentation. It is available to all interested parties. However, because of its size, it is not included in this report.

ANNEX III: USAID STRATEGIC OBJECTIVES (SOs) AND INTERMEDIATE RESULTS (IRs)

A. ADOPTION

By "adoption" it is meant that concepts, methods, and technologies in any of the arenas defined by the four IRs (i.e., policy/regulation, information/training, financing and technology) have, to a reasonable extent, been incorporated in key actors' decision making process. It also implies that adoption made a difference in key actors' plans or actions. Necessary institutional stages such as discussions, studies of concepts, methods, and technologies or its elements may be considered as conducive of adoption.

B. CLEAN ENERGY PRODUCTION AND USE

The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emissions of greenhouse gases." Under specific Brazilian circumstances, indigenous energy resources, and necessary least-cost competitive approaches, various generation technologies are available, including small hydro, solar, biomass, wind and others.

Targeted policies to foster clean and efficient energy production and use and developing a sound policy and regulatory capacity within Brazil are prerequisites for clean and efficient energy production and use. Policy measures include not only the obvious federal, state, and local laws, decrees, regulations, and other guidelines, but also corporate policies and public awareness which may influence choice in the selection of electricity production and consumption.

Emerging from a state-owned structure of operation, many key actors need increased access to information and training on using market based mechanisms to operate and/or finance clean and efficient energy production and use. Financial markets exist in Brazil that can potentially finance clean and efficient energy systems to a higher extent than the current level. Investors, financial institutions, and markets need more information and familiarity as to how existing and innovative mechanisms can be effectively and profitably managed. Management familiarity with such techniques can increase the number of successful financing operations as well as reduce mismatched risk perceptions between developers and investors, presently identified as a major market constraint.

Implementation of new technology and know-how in Brazil is needed to ensure that the best practices are in place at a time of crucial sector reforms. Clean and efficient energy options sometimes require alternative mechanisms to those generally available. USAID support to technology cooperation and projects by U.S. private sector firms can introduce and leverage the application of U.S. technologies under Brazilian conditions.

a. Causal Relationships

USAID/Brazil has decided on a four-pronged approach to achieving SO2, "Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use." As stated earlier, Brazil has already initiated a major sectoral restructuring. In order to incorporate the desired clean energy approach into all aspects of the ongoing power industry changes, USAID has identified four foci for action: policy-making, information dissemination, financing, and technology cooperation. In this way, USAID will have an effect on the regulatory, technological, and market aspects of energy sector restructuring, which will increase the probability of creating a sustainable clean and efficient energy program. The four intermediate results will together form the basis of a new cleaner and more efficient approach to energy policy, production, and use in Brazil.

USAID has been and will continue to provide, under IR 2.1 (Targeted policies promoted that foster clean and efficient energy production and use), long-term technical expertise to the GOB in formulating policies and programs that support both privatization and clean and efficient energy. This will ensure a positive and stable environment for the establishment of market-based clean energy practices and technologies, which will encourage investment in the industry.

Through IR 2.2 (Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use), USAID/Brazil will continue its training and information dissemination activities by designing a clean energy training program and information publication program. This broad-based program will reach both governmental and non-governmental organizations, profit and non-profit institutions, and will cover technical, regulatory, and financial topics. By strengthening the internal capacity of so many key organizations and preparing them for their new roles in the restructured energy sector, USAID seeks to ensure the independence and sustainability of the key actors.

With IR 2.3 (Increased availability and use of financing for clean and efficient energy production and use), the Mission seeks to increase the role of non-USAID funds in the development of the privatized Brazilian energy sector. While funds are available in capital markets of various sizes for clean energy, market actors don't always understand the technology or create market mechanisms which can support and finance clean energy. USAID's role is in increasing understanding and facilitating the development of new markets. For example, USAID/Brazil will continue working with PROCEL to develop implementation and evaluation plans for an Energy Efficiency Loan to Brazil which the World Bank is preparing. PROCEL is charged with developing the technical proposal to the World Bank, and coordinating the implementation of projects to be funded under the loan. USAID/Brazil has also funded an energy efficiency advisor to work with PROCEL, and will continue that assistance. USAID/Brazil is additionally seeking ways to involve UNDP in providing technical assistance, possibly by cost-sharing an energy adviser who will work to facilitate and

coordinate donor activities. Building on the training and regulatory programs, key actors will be able to capitalize on, extend and develop new financial mechanisms to support clean and efficient energy production and use.

IR 2.4 (Increased technology cooperation between U.S. and Brazilian firms for clean and efficient energy production and use), will build on the policy, training and information dissemination, and financial work to work for a more friendly marketplace for clean and efficient energy. Positive examples of new clean energy business opportunities, especially in off-grid rural areas, must exist before the market at large will respond. Technology cooperation will facilitate U.S.-Brazil industry partnerships to develop these seed projects. The Mission intends to extend funding for a Brazil-based U.S. clean energy industry representative to help identify market opportunities, as well as support U.S. trade delegations as a catalyst for trade in specific technologies.

b. Critical Assumptions

The approach taken in this SO is premised on the continuance of an enabling environment in Brazil and of the institutional capacity of USAID. This amounts to the need for a continuing commitment to and implementation of power sector reform and privatization measures at the federal and state levels in Brazil, as well as the continued federal and state government commitment to private investment. Under this framework, the following critical assumptions are made for conditions in Brazil:

(i) Brazil's economy will grow causing increased demand for electricity as projected;

(ii) Power sector reform and privatization in the power industry will increase competition among generation sources. That in turn will cause electricity prices to reach economic recovery costs rendering energy efficiency and cogeneration-generation investments more competitive when compared to conventional power sources. For the same reason, biomass cogeneration-generation will be more attractive;

(iii) Initially, industrial policy will lower import tariffs on renewable energy equipment and augment equipment supply. As a consequence, in-country manufacturing will be attractive. Technology improvements (solar panels and gasifiers) and enhanced market perspectives will reinforce the decreasing trend on equipment's price; and

(iv) Based on the fact that renewable decentralized energy systems are the least cost option in off-grid rural areas, municipal/state level representations, as well as rural cooperatives, will continue to support the establishment of specific financing mechanisms to

expand rural energy services. As the economy and rural incomes grow, willingness/capacity to pay for energy services in rural areas will also increase.

USAID's program activities are focused on mentoring and training key actors in fundamental concepts and methods, and in assisting them with pilot projects to demonstrate the application and feasibility of clean and efficient energy production and use in Brazil. Assumptions must also be included that focus on the degree to which USAID/Brazil can directly impact events or conditions with various key actors, thereby affecting the sector at large.

Assumptions about USAID's ability to successfully achieve the SO's programmatic goals are:

(i) USAID's mentoring, training, and pilot programs will actually foster clean energy initiatives within the Brazilian power sector. Such an assumption is supported by the fact that various elements of the Government of Brazil and the Brazil private sector are in the process of structural and regulatory reform, and many of those actors have asked for USAID assistance;

(ii) Sector reforms will focus on the particular policy, regulatory, and institutional issues that currently hinder the development of clean and efficient energy production and use;

(iii) Needed reforms will continue to be effectively implemented by the GOB's administration; and

(iv) Program resource levels will be sufficient to carry out the appropriate mentoring, training, and pilot activities.

C. COMMITMENT AND CAPACITY OF OTHER DEVELOPMENT PARTNERS

Brazilian Counterparts

In order to keep the SO within USAID/Brazil's manageable interest, a set of key Brazilian actors or development partners were defined when conceiving the SO2 results framework. The identification process benefited from USAID institutional relationships built during the previous two years under the energy special objective. Key actors have also shown a clear commitment and capacity to cooperate with USAID and their agendas are supportive of the results framework.

Although subject to continuing reforms, the set of key actors is highly favored by the current institutional scenario to respond to country and specific agencies goals through clean and efficient energy production and use. Each key actor has overall, as well as specific, roles in both clean and efficient energy production and use. Additionally, due to their expertise, previous track record, and relationship with SpO3, the choice of

particular key actors will have a positive impact, assuming that if key actors are affected by on-going institutional reforms, their personnel and capacity will remain active in the clean and efficient energy production and use arena, assuring SO2 sustainability.

A clear example of commitment by high-level key actors is the fact that under the privatization and independent regulation process, MME, ANEEL, and emerging State regulatory agencies are mandated to create regulatory and financial mechanisms to elicit delivery by the power sector of off-grid renewably based electricity services. Commitment has also been demonstrated by PRODEEM in initiating restructuring actions in numerous aspects of clean energy production in its off-grid programs. In order to further establish and strengthen various implementation links with NGOs, utilities, government and private initiatives, PRODEEM has specifically requested USAID's technical assistance to restructure, decentralize and further expand the clean energy program scope, under a market oriented approach.

In line with SO2's goal to increase the adoption of efficient energy production and use, PROCEL has also requested USAID to play a catalytic role in designing and monitoring energy efficiency programs in utilities. Under recent licensing regulations, ANEEL and PROCEL have the mandate to approve and monitor utilities' programs that will direct 1 percent of gross annual utility revenues (approximately $198 million annually) to energy efficiency activities.

Under sector reforms, key actors have an emerging role that is evolving in a diversified manner at different levels of capacity. Most important is the fact that all key actors continue to demonstrate a strong commitment to the SO2 results framework.

D. ILLUSTRATIVE APPROACHES

IR 2.1: Targeted policies promoted that foster clean and efficient energy production and use

The regulatory partnership between ANEEL and U.S. Public Utility Commissions will provide the opportunity to form a partnership arrangement with the Brazilian federal regulatory agency. This partnership will make available the long experience of U.S. regulatory commissions and their views and assessment of how to develop policy and regulation mechanisms capable of improving management of energy efficiency mechanisms and clean, decentralized energy supply. One example is the assistance to PROCEL and ANEEL in designing and monitoring programs that will direct funds from the "energy efficiency levy" on the utilities' gross energy sales, paid by consumers, to investments in energy efficiency projects.

IR 2.2: Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use

USAID will continue its highly regarded training activities by designing a clean energy training program and publication program involving ANEEL and MME's Centers of Excellence (Federal University of Brasilia and others). The training program will also focus on energy efficiency with PROCEL, INEE (National Institute for Energy Efficiency, a non-profit institution), ABESCO (Brazilian Energy Efficiency Companies National Association), selected power utilities and NGOs. To strengthen the informational links and provide financial agents with appropriate skills to better manage and expand clean financing mechanisms, training will focus on financial institutions.

Training and information provided to ANEEL and State regulatory agencies about integrated resource planning and tariff design will make them effective in negotiating with concessionaires and permissionaires to determine most economic conditions of service, appropriate revenue formulae, and corresponding incentives. As a consequence, regulatory energy price formula will not discriminate between decentralized clean energy production and grid extension.

IR 2.3: Increased availability and use of financing for clean and efficient energy production and use

The World Bank has recognized the threat that privatization and lack of clean energy market mechanisms pose to rural communities and is developing an Integrated Commercial/Social Power loan for the northeast of Brazil. The aim of the loan is to create a market in rural areas to serve the rural poor in the absence of a viable grid connection, largely through village and residential scale renewable energy systems. The Clean and Efficient Energy strategic objective will support the World Bank loan initiative and will focus on activities that have the potential to reduce barriers to market development. These barriers were identified as: lack of local technical expertise on renewable energy to rural communities (project development, operation, and maintenance) by utilities and NGOs; micro credit financing; institutional articulation between state and federal agencies; information support for project development; regulatory constraints; high market entry cost to new agents; and others.

USAID/Brazil has funded an energy efficiency advisor to work with PROCEL, and envisions continuing that assistance, as well as assistance to ANEEL to coordinate the inclusion of energy efficiency into Brazil's new regulatory regime. More specifically, PROCEL has requested USAID assistance to develop implementation and evaluation plans for an Energy Efficiency Loan to Brazil that the World Bank is preparing. PROCEL is charged with developing the technical proposal to the World Bank, and coordinating the implementation of projects to be funded under the loan.

IR 2.4: Increased technology cooperation between U.S. and Brazilian firms for clean and efficient energy production and use

Positive examples of new clean energy business opportunities, especially in off-grid rural areas, must exist before the market at large will respond. Technology cooperation will facilitate U.S.-Brazil industry partnerships to develop these seed projects. Already opportunities for renewable energy applications in Brazil have been identified in four settings:

(i) Off-grid renewable energy projects in the Legal Amazon (using sawmill residues in Mato Grosso and Pará);
(ii) Small hydropower projects up to 25 MW both grid or mini-grid connected;
(iii) Grid connected projects (biomass fueled and windmill generation projects above 10 MW) in the south and southeast regions; and
(iv) Off-grid renewable energy projects (wind and small solar generation projects) in the northeast and north.

In these cases, where grid extension to conventional power sources has already been determined to be economically unfeasible and small renewable energy applications are the least-cost option, the constraints are market delivery mechanisms and sustainability. USAID/Brazil would like to extend funding for a Brazil-based U.S. clean energy industry representative to continue to identify market opportunities, as well as develop the seed projects that will create delivery mechanisms. In addition, it will support U.S. trade delegations as a catalyst for trade in particular technologies. This will transform demand for decentralized renewable energy in rural areas of Brazil to functional markets for U.S. clean energy technologies.

E. SUSTAINABILITY

For the restructuring of Brazil's power sector to be environmentally and economically sustainable, Brazilian institutions must not only be exposed to, but must incorporate policy measures and financing mechanisms that make the implementation of such environmentally sustainable paths. Program activities must provide these institutions with the capacity to continue to encourage the development of renewable energy sources in Brazil, once USAID support ends. The actions of these institutions must be socially and economically reinforced.

Market sustainability requires a certain volume of transactions, which assumes accessible finance, buyers and sellers. It also requires alternative and competitive networks and channels capable of distributing renewable energy goods along with customer confidence for maintenance. Sustainability of USAID's energy program will be achieved by creating a freestanding market for rural energy services using renewable energy.

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For the increased use of renewable energy and energy efficiency to be sustainable, it must be based on market mechanisms. The barrier is not technology; the technology is proven. The barriers are in the establishment of sustainable markets and delivery mechanisms for renewable energy. Energy efficiency and commercialization of renewable energy for on and off-grid applications face institutional, financial, and regulatory barriers. The changes now sweeping the Brazilian energy sector offer an important opportunity to shape the policy environment in ways that will support expanded private investment in renewable energy sources.

F. JUDGING SUCCESS

USAID/Brazil will measure the degree to which SO activities result in key actors' adoption of concepts, methods and technologies for clean and efficient energy production and use. USAID will be meeting in mid-1998 with the key actors to refine the submitted program benchmarks for adopting clean and efficient energy production and use. This will include the establishment of baseline and annual target levels. These indicators will be updated annually if necessary. Cooperating agencies and contractors will participate in this process.

During these same meetings, USAID will begin to establish with key actors, cooperating agencies, and contractors an agreed annual working plan to monitor and collect indicators as well as establishing targets and baselines. A minimal monitoring structure for indicator collection is already in place and the intention is to improve its performance and reliability by incorporating both collection methodology refinements and monitoring routines into the SO's task orders. Cooperating agencies and contractors will be asked to keep a detailed record of achievements compatible with selected indicators that will be consolidated and reported to management. The refined indicators, baseline data, and annual targets will be reported on in the subsequent R4.

G. INDICATORS

SO 2: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient. energy production and use

Indicator 1: Incorporation of concepts, methods, and technologies for clean and efficient energy production and use in the operations of key actors

Unit of Measure: Percentage (%)

Source: Contractors, cooperating agencies and key actors

Indicator Description: Percentage will be determined by the number of key actors who have met in that year 60 percent of their long-term program benchmarks for

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adopting clean and efficient energy production and use, divided by the total number of key actors. Key actors are the Ministry of Mines and Energy, PRODEEM/MME, PROCEL/MME, Energy Service Companies, Brazilian National Association for Energy Service Companies (ABESCO), Energy Efficiency Agencies or Institutes, MME's Centers of Excellence and related universities, National Research Center for Power Research (CEPEL), investor and public owned power utilities (concessionaires), rural cooperatives, power permissionaires, NGOs, Renewable Energy Developers and their associations, ANEEL and selected State regulatory agencies, selected development and commercial banks and financial/investment institutions. The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases."

Comments: As activities initiate with each key actor, task orders will include identification whether actor has annual program benchmarks for adopting clean and efficient energy production and use. Points within the actor's annual plan that relate to adoption of clean and efficient energy production and use (within the limit of one year, after activities are initiated) will be identified between by key actor and contractor/cooperating agencies. In the case that actor does not have a defined annual plan, a set of realistic benchmarks will be set. Contractor/cooperating agencies will be required by USAID/Mission and USAID/Global Bureau to check achievement of benchmark entries by following on and requesting information to said key actor.

IR 2.1: Targeted policies promoted that foster clean and efficient energy production and use

Indicator 2.1.1: Advancement of policies and regulations by key actors that contribute to the adoption of concepts, methods, and technologies for clean and efficient energy production and use

Unit of Measure: Number of steps accomplished in policy formation

Source: Contractors, cooperating agencies and key actors

Indicator Description: Steps are defined as: identification, analysis, development, validation, promotion, training, adoption, implementation and enforcement. The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases." Key actors are the Ministry of Mines and Energy, PRODEEM/MME, PROCEL/MME, Energy Service Companies, Brazilian National Association for Energy Service Companies (ABESCO), Energy Efficiency Agencies or Institutes, MME's Centers of Excellence and related universities, National Research Center for Power Research (CEPEL), investor and public owned power utilities (concessionaires), rural cooperatives, power

permissionaires, NGOs, Renewable Energy Developers and their associations, ANEEL and selected State regulatory agencies, selected development and commercial banks and financial/investment institutions.

Comments: Targeted policies (inclusive of private sector firms' corporate policies, or utilities' policies) and regulations (Federal and State) will be defined in the R4. Elements of policies/regulations that foster clean and efficient energy production and use may also be considered as targets for this indicator.

IR 2.2: Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use

Indicator 2.2.1: Key actors using market-based mechanisms to operate and/or finance clean and efficient energy production and use

Unit of Measure: Percentage (%)

Source: Contractors, cooperating agencies and key actors

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases." Key actors are the Ministry of Mines and Energy, PRODEEM/MME, PROCEL/MME, Energy Service Companies, Brazilian National Association for Energy Service Companies (ABESCO), Energy Efficiency Agencies or Institutes, MME's Centers of Excellence and related universities, National Research Center for Power Research (CEPEL), investor and public owned power utilities (concessionaires), rural cooperatives, power permissionaires, NGOs, Renewable Energy Developers and their associations, ANEEL and selected State regulatory agencies, selected development and commercial banks and financial/investment institutions.

Comments: As program activities with key actor(s) initiate, task orders include identification of level of target behaviors currently adopted. During and after completion of activity, contractor/cooperating agencies are required by USAID/Mission and USAID/Global Bureau to follow on and request reporting from said key actor about adoption of target behaviors. Specific task order will compile reports from key actor(s) and compute indicator.

Result 2.3: Increased availability and use of financing for clean and efficient energy production and use

Indicator 2.3.1: Clean and efficient energy projects under development that are funded by mechanisms created, leveraged or supported by USAID

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Unit of Measure: Number of projects

Source: Project surveys, contractors, cooperating agencies and key actors

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases."

Indicator 2.3.2: Non-USAID funds influenced or leveraged to develop renewable energy, energy efficiency, or other clean energy projects, as a result of USAID activities

Unit of Measure: U.S. Dollars

Source: Project surveys, contractors, cooperating agencies and key actors

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases."

Comments: Non-USAID funding value influenced by its activities (e.g., portions of World Bank loans, the developers' portion of REPSO cost-shares, etc.), GOB funds made available under the influence of USAID.

Result 2.4: Increased technology cooperation between U.S. and Brazilian firms for clean and efficient energy production and use

Indicator 2.4.1: Cooperation initiatives (pilot programs, research/development delegations or other cooperation initiatives) that facilitated the application of clean and efficient energy technologies and know-how under Brazilian conditions

Unit of Measure: Number of cooperation initiatives

Source: Contractors, cooperating agencies, and key actors

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases." Under specific Brazilian circumstances, indigenous energy resources, and necessary least-cost competitive approaches, various generation technologies are available, including small hydro, solar, biomass, wind and others.

Indicator 2.4.2: Clean and efficient energy projects of key actors, or influenced by key actors, which benefited from USAID/Brazil funded cooperation initiatives

Unit of Measure: Number of projects

Source: Contractors, cooperating agencies, and key actors

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases." Under specific Brazilian circumstances, indigenous energy resources, and necessary least-cost competitive approaches, various generation technologies are available, including small hydro, solar, biomass, wind and others. Key actors are the Ministry of Mines and Energy, PRODEEM/MME, PROCEL/MME, Energy Service Companies, Brazilian National Association for Energy Service Companies (ABESCO), Energy Efficiency Agencies or Institutes, MME's Centers of Excellence and related universities, National Research Center for Power Research (CEPEL), investor and public owned power utilities (concessionaires), rural cooperatives, power permissionaires, NGOs, Renewable Energy Developers and their associations, ANEEL and selected State regulatory agencies, selected development and commercial banks and financial/investment institutions.

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Appendix V-A: STRATEGIC OBJECTIVE 2: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use

STRATEGIC OBJECTIVE 2: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use

APPROVED:
COUNTRY/ORGANIZATION: USAID/Brazil

Result: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use

Indicator 1: Incorporation of concepts, methods, and technologies for clean and efficient energy production and use in the operations of key actors

Unit of Measure: Percentage (%)

Source: Contractors, cooperating agencies and key actors

Year	1997	1998	1999	2000	2001	2002
Target	Baseline					
Actual						

Indicator Description: Percentage will be determined by the number of key actors who have met in that year 60 percent of their long-term program benchmarks for adopting clean and efficient energy production and use, divided by the total number of key actors. Key actors are the Ministry of Mines and Energy, PRODEEM/MME, PROCEL/MME, Energy Service Companies, Brazilian National Association for Energy Service Companies (ABESCO), Energy Efficiency Agencies or Institutes, MME's Centers of Excellence and related universities, National Research Center for Power Research (CEPEL), investor and public owned power utilities (concessionaires), rural cooperatives, power permissionaires, NGOs, Renewable Energy Developers and their associations, ANEEL and selected State regulatory agencies, selected development and commercial banks and financial/investment institutions. The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases."

Comments: As activities initiate with each key actor, task orders will include identification whether actor has annual program benchmarks for adopting clean and efficient energy production and use. Points within the actor's annual plan that relate to adoption of clean and efficient energy production and use (within the limit of one year, after activities are initiated) will be identified between by key actor and contractor/cooperating agencies. In the case that actor does not have a defined annual plan, a set of realistic benchmarks will be set. Contractor/cooperating agencies will be required by USAID/Mission and USAID/Global Bureau to check achievement of benchmark entries by following on and requesting information to said key actor.

STRATEGIC OBJECTIVE 2: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use

APPROVED:
COUNTRY/ORGANIZATION: USAID/Brazil

Result 2.1: Targeted policies promoted that foster clean and efficient energy production and use

Indicator 2.1.1: Advancement of policies and regulations by key actors that contribute to the adoption of concepts, methods, and technologies for clean and efficient energy production and use

Unit of Measure: Number of steps accomplished in policy formation

Source: Contractors, cooperating agencies and key actors

Year	1997	1998	1999	2000	2001	2002
Target	Baseline					
Actual						

Indicator Description: Steps are defined as: identification, analysis, development, validation, promotion, training, adoption, implementation and enforcement. The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases." Key actors are the Ministry of Mines and Energy, PRODEEM/MME, PROCEL/MME, Energy Service Companies, Brazilian National Association for Energy Service Companies (ABESCO), Energy Efficiency Agencies or Institutes, MME's Centers of Excellence and related universities, National Research Center for Power Research (CEPEL), investor and public owned power utilities (concessionaires), rural cooperatives, power permissionaires, NGOs, Renewable Energy Developers and their associations, ANEEL and selected State regulatory agencies, selected development and commercial banks and financial/investment institutions.

Comments: Targeted policies (inclusive of private sector firms' corporate policies, or utilities' policies) and regulations (Federal and State) will be defined in the R4. Elements of policies/regulations that foster clean and efficient energy production and use may also be considered as targets for this indicator.

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STRATEGIC OBJECTIVE 2: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use

APPROVED:
COUNTRY/ORGANIZATION: USAID/Brazil

Result 2.2: Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use

Indicator 2.2.1: Key actors using market-based mechanisms to operate and/or finance clean and efficient energy production and use

Unit of Measure: Percentage (%)

Source: Contractors, cooperating agencies and key actors

Year	1997	1998	1999	2000	2001	2002
Target	Baseline					
Actual						

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases." Key actors are the Ministry of Mines and Energy, PRODEEM/MME, PROCEL/MME, Energy Service Companies, Brazilian National Association for Energy Service Companies (ABESCO), Energy Efficiency Agencies or Institutes, MME's Centers of Excellence and related universities, National Research Center for Power Research (CEPEL), investor and public owned power utilities (concessionaires), rural cooperatives, power permissionaires, NGOs, Renewable Energy Developers and their associations, ANEEL and selected State regulatory agencies, selected development and commercial banks and financial/investment institutions.

Comments: As program activities with key actor(s) initiate, task orders include identification of level of target behaviors currently adopted. During and after completion of activity, contractor/cooperating agencies are required by USAID/Mission and USAID/Global Bureau to follow on and request reporting from said key actor about adoption of target behaviors. Specific task order will compile reports from key actor(s) and compute indicator.

STRATEGIC OBJECTIVE 2: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use

APPROVED:
COUNTRY/ORGANIZATION: USAID/Brazil

Result 2.3: Increased availability and use of financing for clean and efficient energy production and use

Indicator 2.3.1: Clean and efficient energy projects under development which are funded by mechanisms created, leveraged or supported by USAID

Unit of Measure: Number of projects

Source: Project surveys, contractors, cooperating agencies and key actors

Year	1997	1998	1999	2000	2001	2002
Target	Baseline					
Actual						

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases."

Comments:

STRATEGIC OBJECTIVE 2: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use

APPROVED:
COUNTRY/ORGANIZATION: USAID/Brazil

Result 2.3: Increased availability and use of financing for clean and efficient energy production and use

Indicator 2.3.2: Non-USAID funds influenced or leveraged to develop renewable energy, energy efficiency, or other clean energy projects, as a result of USAID activities

Unit of Measure: U.S. Dollars

Source: Project surveys, contractors, cooperating agencies and key actors

Year	1997	1998	1999	2000	2001	2002
Target	Baseline					
Actual						

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases."

Comments: Non-USAID funding value influenced by its activities (e.g., portions of World Bank loans, the developers' portion of REPSO cost-shares, etc.), GOB funds made available under the influence of USAID.

STRATEGIC OBJECTIVE 2: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use

APPROVED:
COUNTRY/ORGANIZATION: USAID/Brazil

Result 2.4: Increased technology cooperation between U.S. and Brazilian firms for clean and efficient energy production and use

Indicator 2.4.1: Cooperation initiatives (pilot programs, research/development delegations or other cooperation initiatives) that facilitated the application of clean and efficient energy technologies and know-how under Brazilian conditions

Unit of Measure: Number of cooperation initiatives

Source: Contractors, cooperating agencies, and key actors

Year	1997	1998	1999	2000	2001	2002
Target	Baseline					
Actual						

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases." Under specific Brazilian circumstances, indigenous energy resources, and necessary least-cost competitive approaches, various generation technologies are available, including small hydro, solar, biomass, wind and others.

Comments:

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STRATEGIC OBJECTIVE 2: Increased adoption by key actors of concepts, methods, and technologies for clean and efficient energy production and use

APPROVED:
COUNTRY/ORGANIZATION: USAID/Brazil

Result 2.4: Increased technology cooperation between U.S. and Brazilian firms for clean and efficient energy production and use

Indicator 2.4.2: Clean and efficient energy projects of key actors, or influenced by key actors, which benefited from USAID/Brazil funded cooperation initiatives

Unit of Measure: Number of projects

Source: Contractors, cooperating agencies, and key actors

Year	1997	1998	1999	2000	2001	2002
Target	Baseline					
Actual						

Indicator Description: The term "clean and efficient energy production and use" is interpreted as "any market-oriented and sustainable generation process or appropriate end-use of energy that implies close-to-zero or less-than-zero emission of green house gases." Under specific Brazilian circumstances, indigenous energy resources, and necessary least-cost competitive approaches, various generation technologies are available, including small hydro, solar, biomass, wind and others. Key actors are the Ministry of Mines and Energy, PRODEEM/MME, PROCEL/MME, Energy Service Companies, Brazilian National Association for Energy Service Companies (ABESCO), Energy Efficiency Agencies or Institutes, MME's Centers of Excellence and related universities, National Research Center for Power Research (CEPEL), investor and public owned power utilities (concessionaires), rural cooperatives, power permissionaires, NGOs, Renewable Energy Developers and their associations, ANEEL and selected State regulatory agencies, selected development and commercial banks and financial/investment institutions.

Comments:

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