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**THE A.I.D. EXPERIENCE
WITH INDEPENDENT
POWER GENERATION**

BY

JAMES B. SULLIVAN, PH.D.

DIRECTOR

OFFICE OF ENERGY

BUREAU FOR SCIENCE AND TECHNOLOGY

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

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THE A.I.D. EXPERIENCE WITH INDEPENDENT POWER GENERATION

The topic of independent power generation has become extremely important not only in the United States, but also throughout the world. Since 1978 the United States, under the Public Utilities Regulatory Policies Act (PURPA), has seen the rapid growth of independent, nonutility power generation.

Elsewhere, governments and state utilities are turning to independent power producers to supply needed additional capacity. The first major independent power project overseas was constructed and operated by a private consortium led by Hopewell Limited of Hong Kong in the People's Republic of China -- a 700 MW coal-fired plant at Shajiao.

Currently, we are aware of 80 active proposals for independent power projects around the world that have developed over the past two years. This begins to give you a feeling of the magnitude of the international interest in this subject.

Before I proceed further, I would like to briefly outline my presentation. First, I believe it is important to discuss the commitment of the U.S. Agency for International Development (A.I.D.) to energy, particularly electric power development, conservation and demand management, and to review in general some of our participation in this area. Second, I will turn to the direct discussion of A.I.D. experience with independent power and explain what A.I.D. has done. Third, from this experience, I will outline impediments that operate to frustrate independent power and lessons we have learned that are applicable to the situation in the Caribbean and Central America. Finally, I will describe briefly what A.I.D. and, in particular, my Office of Energy is planning to do to assist the development of independent power projects and how we can be of direct assistance to you.

A.I.D. INVOLVEMENT IN ENERGY

As you may know, the role of A.I.D. is to support economic and social development in over 70 countries throughout the world. The ultimate goal of the Agency for International Development is a world in which economic growth and development are self-sustaining and the extremes of poverty have been eliminated. One critical input to achieving this goal is energy. However, while energy problems are abating in the United States, they are growing more severe in A.I.D.-assisted countries. Indeed, to attain A.I.D.'s development targets in per capita income and caloric intake will require energy growth rates of at least 7 percent per year. Therefore, without adequate attention, energy problems will continue to stifle economic growth in A.I.D.-assisted countries.

The Challenge of Power Shortages

One of the major energy problems facing developing countries in the 1980s has been the difficulty in providing sufficient amounts of electricity at affordable prices. Recognizing that electricity shortfalls are causing a serious constraint to development in over half of the A.I.D.-assisted countries, the Agency was asked last year by the Committee on Appropriations of the U.S. House of Representatives to prepare a report on the magnitude of the power crisis, its impact for future economic and social development in developing countries, and its implications for U.S. technologies and services to address this problem. The committee also requested that the study assess appropriate incentives for private-sector participation in power generation.

I would like to share with you the findings of our study.

To put things in perspective, let me start by saying that the process of economic development is in large part traceable to the substitution of energy for muscle in the performance of almost every type of industrial, agricultural, and domestic task. Therefore, it is not surprising that the demand for energy in developing countries has been growing at rates of over 5.5 percent per year during the past 15 years, and the demand for electricity has been growing at over 7 percent per year. Yet, developing countries, on the average, use only 500 kWh of electricity per capita per year. A.I.D.-assisted countries use only 250 kWh per capita compared to over 10,500 kWh per capita in the United States and 6,000 kWh per capita in Europe and Japan. In other words, developing countries with a population of 3.8 billion -- over 75 percent of world population -- consume only 18 percent of total electricity in the world.

Two major problems face the power sector in developing countries: (i) an acute shortage of electricity, and (ii) insufficient financial resources to expand supply systems fast enough to keep up with the growing demand.

Faced with high demand growth rates, many countries now experience power shortages of over 10 percent of their generation capability. In Pakistan, for example, during the past 5 years, power shortages have been over 25 percent of the demand, in India, over 10 percent, in the Dominican Republic over 15 percent, and similar situations exist in many other countries. The economic impact of these shortages on developing countries has been tremendous. In Pakistan, for example, load shedding to the industrial sector alone has led to a 1.8 percent decrease in GDP and a 4.2 percent decrease in the country's foreign exchange earnings.

Yet as demand for electricity has grown in developing countries, many governments have found it increasingly difficult to allocate sufficient resources to the power sector to ensure that demand is met. In many countries the power sector requires more than 20 percent of the government's total development budget and power-sector foreign borrowing is greater than 30 percent of total country foreign debt. Because of their financial difficulties, many utilities in developing countries do not qualify for loans from international development or commercial banks making prospects for improved power supply more uncertain.

Our study projects that if the current trend in electricity-supply expansion in developing countries continues under modest economic growth rates of 3.5 to 5.5 percent per year between now and 2008, developing countries will need an additional power generation capacity of over 1,500 GW (compared to 1984 installed capacity of 450 GW). This will require an annual investment of about \$140 billion per year, compared to current expenditures of about \$50 billion. Assembling financial resources for this level of expansion and investment is clearly beyond the capabilities of developing countries and alternative, less costly approaches to improving the power supply situation are required.

On the supply side, the power sector in developing countries is often characterized by inadequate planning and management, poor performance of power plants, and high transmission and distribution losses. For example, typical steam plants in the United States require 9,000 to 11,000 Btu of fuel per kWh of electricity. In many developing countries, the fuel requirement is over 13,000 Btu per kWh. Many power plants in developing countries are available for operation only 50 to 60 percent of the time, compared with over 85 percent in the United States and other industrialized countries. Finally, transmission and distribution losses, which should normally be below 10 percent of gross generation, exceed 20 percent in many developing countries.

On the demand side there are significant opportunities for conserving electricity and reducing the need for additional generation capacity by improving the efficiency of electric motors, lighting systems, refrigerators, and air conditioners, and by instituting energy-conservation and demand management measures. Electricity demand can be reduced by more than 30 percent through rigorous energy-conservation and efficiency-improvement efforts. But, because of the lack of institutional capability to develop and implement conservation programs, lack of financial incentives, and lack of know-how, very few countries have been able to take advantage of efficiency-improvement opportunities.

Our study indicates that the need for additional generation capacity can be reduced dramatically by taking advantage of opportunities for electricity supply and end use efficiency improvements -- a reduction from 1,500 GW under the business-as-usual scenario to 700 GW during the 1988-2008 period. But even this "least cost" strategy will require investments on the order of \$70 billion per year. International development organizations like the Interamerican Development Bank and the World Bank can supply some of this capital. However, there will be a capital gap of about \$300 billion during the next 20 years.

A.I.D. and Electric Power

Before going into detail about A.I.D.'s power activities, I would like to put our power activities into the perspective of A.I.D.'s overall development focus.

Our ongoing charter is to systematically help countries to improve their capability to help themselves. We provide grants and loans for technical assistance, training, and equipment procurement in many economic sectors including agriculture, forestry, health, and energy,

including power. In 1988, the Agency's budget for energy was \$267 million. Of that, about \$180 million was for power projects and activities.

The Agency is organizationally divided between the Missions that operate within developing countries and our central operation in Washington that supports and enhances the Mission activities. The Bureau for Science and Technology, in Washington, has the responsibility to support the development of new ideas and research for all of the A.I.D.-assisted countries. My Office of Energy, in the S&T Bureau, provides technical assistance, research, training and project assistance to the Missions in areas such as electric power planning, resource development, conservation and project development.

The Office of Energy of A.I.D.'s Bureau for Science and Technology is responsible for helping to ensure that power problems do not constrain A.I.D.'s ultimate goals.

A.I.D. recognizes that adequate, reliable and affordable electric power is essential to industrial, commercial and agricultural development and to the improvement of living standards. The Agency is firmly committed to applying its limited resources to solving the problems identified by A.I.D.-assisted countries.

A.I.D. wants to take a very active role in the power sector in A.I.D.-assisted countries. Due to its necessarily limited budgets for such activities, the Office of Energy attempts to direct its efforts toward areas that will have a high impact with a low investment.

The Office of Energy often seeks to identify situations where it can play a coordination role or a "broker's" role, so to speak -- where it can help nurture projects to the point where larger investors (either in the private sector, in government, or from development banks) will commit themselves to financing and implementing the projects. A.I.D. is also very committed to supporting projects that will increase indigenous resource development and use. As I illustrated earlier, energy imports are having a serious impact on many developing economies. By supporting the development and efficient use of indigenous resources, A.I.D. can play a very important role in helping to reduce dependence on imported energy and relieve pressure on foreign exchange reserves.

Energy Conservation and Demand Management

Before proceeding into my discussion of A.I.D.'s experience with independent power, I would like to make clear our strong commitment to the other major subjects of this conference -- energy conservation and demand management.

Since the late 1970's, the Agency has made energy conservation one of its key energy priorities. At the country and regional levels, multi-year, multimillion programs have been implemented in Jamaica; in Central America through ICAITI; in the Dominican Republic; in Egypt; in Morocco; in Pakistan; and in the Philippines. In Egypt, the local USA.I.D. mission is working with Office of Energy to initiate the implementation of a \$50 million energy conservation technology transfer program which will make it the largest ever undertaken in a developing country. All the above projects focused primarily on industry, and to a lesser extent, on buildings.

As far as electric power is concerned, A.I.D. activities have originally focused on the planning side and on rural electrification with NRECA. More recently, a number of projects have included conservation and other demand management techniques. For example, in Pakistan, the Agency has funded a major technical assistance program to the national utility which includes an end use reduction component (mostly through power factor reduction). Another effort in Pakistan has been to carry out prefeasibility studies for rehabilitation of thermal power plants.

The relatively low oil prices have not lowered the commitment of the Agency to energy efficiency. On the contrary, A.I.D. is now embarking on a series of pioneer initiatives in industry and electric power. In Morocco, for instance, USA.I.D. is in the final stages of the preparation of a \$5 million energy demand management program which aims at improving all aspects of energy production, distribution and use through training, awareness programs, technical and special studies to be carried out through an innovative public-private sector partnership.

In the power sector, *per se*, the Office of Energy is now planning to support several major regional programs in the areas of energy conservation and demand management, load management and cogeneration. One of our most exciting projects is the pilot load control project currently undertaken in Costa Rica with the national electric utility (ICE) that aims at saving not less than 10

percent of the coincidental peak demand of a group of medium and larger users. Based on the preliminary results of this program, it appears that the Latin America Caribbean region could be a good candidate for such new initiatives.

THE A.I.D. EXPERIENCE WITH INDEPENDENT POWER GENERATION

Now, let me discuss the role of the Agency in independent power development. Interest in independent power is increasing rapidly. Pakistan, the Philippines, Indonesia, Jamaica, the Dominican Republic, Costa Rica, Brazil, Turkey, Argentina, China, Thailand and other countries are formulating, and in some cases, implementing independent power policies, i.e., policies allowing the independent power producers to invest in power plants, generate electricity, and sell it to the grid or other users. But despite the clear advantages of independent power, numerous barriers have discouraged or prohibited private investment. These include institutional and policy barriers, weak domestic economies, political risks, technical risk, and financial risk. To overcome these barriers a range of U.S. and host-country government policy initiatives are needed.

The A.I.D. experience in supporting the development of independent power can be grouped into four areas:

- A. Institutional Development Experience
- B. Information Dissemination Experience
- C. Financial Support Experience
- D. Project Development Experience

I will explain each of these in turn.

A. Institutional Development Experience

The first area, Institutional Development Experience, refers to support for the development of institutions, laws, procedures, and programs for promoting the development of independent power. This has most commonly taken the form of country-specific assessments of independent power and direct technical assistance by experts in independent power to interested countries.

A.I.D. has conducted assessments of the potential for independent power production in Pakistan, India, Thailand, the Philippines, Costa Rica, the Dominican Republic and Indonesia. These studies have identified impediments to, and opportunities for, independent power from biomass and fossil fuel systems.

In November of last year, a team of ECSP consultants recently came to Costa Rica at the request of the Mission and the Ministry of Natural Resources, Energy and Mines, to carry out an assessment of the potential for non-utility participation in power generation. The study had 3 objectives: (1) Estimate the potential for independent power generation in Costa Rica, primarily for plants below 10 MW; (2) Identify and analyze major impediments to the development of independent power generation, (3) Propose an action plan to the national utility (ICE) and the government to remove these impediments, where economically justified. The study found that independent power is both technically and economically feasible and that it could alleviate most of the capacity problems currently facing the electric utility.

To follow up on the recommendations of this study, the Office of Energy performed an in-depth study of the potential for power generation from the sugar industry.

A similar study in India was conducted in 1986 in the industrial states of Gujarat and Maharashtra. The non-utility sector in much of India has been quick to take up the idea of independent power generation. For example, the Faridabad Industrial Association recently submitted a proposal to the government to construct and operate a 100 MW power plant to service its member industries.

A.I.D. has been integrally involved in the power sector in the Dominican Republic. It has funded several projects over the past few years including:

- Assessment of the potential for cogeneration,
- Assessment of private participation in energy generation,
- Feasibility of independent power generation in free trade zones, and

- An independent power roundtable seminar.

The Dominican Republic, as you know, is suffering from a variety of power problems, chief among them is the high cost of imported oil, lack of power generation capacity, and the unreliability of much of their government-owned capacity.

To begin this process, in 1986, a team of three energy and policy experts visited the Dominican Republic to study such Dominican industries as sugar, food processing, and pulp and paper.

Their preliminary findings indicate that the non-utility sector can provide as much as 15 percent additional electricity capacity from cogeneration. In the near term the financial potential for cogeneration is a modest 15 MW (total installed capacity is approximately 1,010 MW). However, over the long term (1987-1997) the financial potential could increase to 56 MW. These represent projects that can produce returns competitive with other investments.

The primary impediment to cogeneration appears to be existing policies and legislation which discourage independent power generation. There is a precedent for independent power sales to the public utility, but the long-standing agreements which set the price and quality of service for generation from large-scale industries may not apply to the small-scale options identified by the study team.

The A.I.D. mission in Santo Domingo supported a study of the potential for independent power in Free Trade Zones (FTZs) that found that the non-utility sector could economically develop power plants in these zones. The research evaluated the electrical power needs of the FTZs in the Dominican Republic and explored the feasibility of installing independent power generation systems to satisfy such needs.

Since the development of independent power is a new concept for the government, there are many issues that need to be resolved before the great potential can be achieved. To help identify and resolve some of these issues, in July, A.I.D. organized an Independent Power Roundtable discussion in the Dominican Republic. The purpose of the meeting was to define a strategy and make recommendations on specific issues surrounding the proposed legislation for non-utility sector participation in the country's power generation. Issues explored included the creation of a coordinating organization, the criteria for awarding franchises, tariffs, energy sales, and interconnection.

Regarding the provision of experts on independent power, in Pakistan, A.I.D. is funding resident technical experts to assist the Ministry of Water and Power, the state-owned utility and an intermediate credit institution in reviewing, evaluating and financing independent power projects. Also, A.I.D. is sending a team of U.S. utility and independent power experts to advise the Philippines national utility and its energy planning office.

B. Information Dissemination Experience

The second category of A.I.D. support to independent power generation and demand management is information dissemination support. Until recently, in many developing countries and many developed ones as well, state utilities were solely responsible for power generation. Now, however, as we have all learned, there are many good reasons for encouraging the development of non-utility power generation and supporting demand management programs. The fact that you are here in this meeting indicates that you understand this. However, many of the key players in the power sector, in industry, and in the financial community have to be informed about these subjects. These individuals and institutions must become aware of the technical and economic benefits of demand management and non-utility power generation in order to obtain their support.

The independent power sector has to be convinced that they should participate and should invest time, money, and effort in developing power generation facilities. Utility staff have to be convinced that the non-utility sector is capable of generating reliable, high-quality power -- that independent power can improve the power situation, not cause problems. And, finally, financial institutions have to be educated on the economic attractiveness and technical viability of non-utility power systems so that they will provide funds for project development.

A.I.D. has supported several types of activities that have sought to provide this type of information:

1. Workshops

In addition to this workshop, A.I.D. organized and funded a similar regional workshop on independent power in Bangkok in the fall of 1986 and country-specific workshops in India and the Dominican Republic, as mentioned above. A.I.D. is planning to hold a workshop in Indonesia.

2. Independent Power Database

In order to facilitate our efforts to support independent power development, A.I.D. is sponsoring the development of a database on independent power generation in developing countries. The goal of this database is to provide up-to-date information about the activities and issues related to the development and operation of independent power projects in developing countries. This information can be used by A.I.D.-assisted countries to learn of activities in countries similar to their own. It can be used by the equipment manufacturers to identify countries and projects worth pursuing. And it can be used by development organizations to track the growth of independent power activities throughout the world.

A network of contacts throughout the world is being set up to collect information on independent power projects and feed this information into the database. Currently, contacts have been established in Pakistan, India, Costa Rica, the Dominican Republic. Contacts will soon be established in Indonesia, the Philippines, and Thailand.

Our contact in the Dominican Republic has identified a total of 13 projects, seven are cogeneration projects and six are power-only. To date, 58 project opportunities had been identified in five countries: Pakistan, Indonesia, India, Thailand, and the Dominican Republic. In addition, 32 projects are currently under development or are operating in 10 countries: Pakistan, Jamaica, Argentina, Costa Rica, Turkey, India, China, Indonesia, the Philippines, and the Dominican Republic.

3. Private Power Report

A.I.D. periodically publishes a short report presenting the some of the findings of the database on independent power activities and opportunities. The first issue should be out this month.

4. Papers and Studies

The A.I.D. report, "*Cogeneration in Developing Countries*," was one of the first attempts by the Office of Energy to analyze the potential for independent power generation in A.I.D.-assisted countries. This study analyzed the prospects and problems of cogeneration as an alternative power supply and energy conservation scheme in developing countries. It also discussed the role of A.I.D. in promoting non-utility involvement in cogeneration development as a way to expand power supply and improve fuel efficiency in developing countries.

More recently, in response to a request from Congress, the Agency, as mentioned, prepared an in-depth study of the extent of the power crisis in developing countries and prepared a report entitled "*Power Shortages in Developing Countries: Magnitude, Impacts, Solutions, and the Role of the Private Sector*". This report, discussed earlier, analyzes the magnitude, causes, and impacts of power shortages in developing countries, identifies possible solutions, describes a role for the private sector, and identifies an appropriate role for A.I.D.. Over 3,000 copies were prepared and distributed to a wide audience in hopes of improving the awareness of the power situation in developing countries.

5. Independent Power Training Course

Finally, A.I.D. is sponsoring independent power executive seminar. The purpose of this seminar is to examine the dimensions of the power crisis and explore ideas on the possibility of non-utility participation in electricity generation as a viable solution to the crisis in some countries. Participants will include executive-level decision makers from selected developing countries, from both the government and private sectors, who are in a position to influence policy reform in their countries' power sectors. The hoped-for outcome of this seminar is that these representatives will be motivated to support independent power initiatives in their own countries. Additionally, A.I.D. will gain a better understanding about the barriers that impede privatization in the power sector and ways to reduce the risks.

This is the first in a series of seminars and training programs on independent power. Later courses will be longer and more technically oriented for staff members charged with planning, designing and implementing projects.

C. Financial Support Experience

Generally, because of its limited financial resources, A.I.D. typically prefers to play a broker's role in independent power projects: supporting feasibility and policy studies and bringing the private sector and other sources of funding together to fund the actual development of projects. A.I.D. prefers to "leverage" its funds, i.e. to use its funds as a catalyst to attract private, public, and development bank funding for projects.

A.I.D., nevertheless, does have some recent direct experience in structuring financing for independent power projects. In Pakistan, a major recipient of U.S. foreign assistance, A.I.D. is contributing \$125 million to the Private Sector Energy Development Fund, to be administered by the World Bank and a Pakistan intermediate credit institution. The Fund will provide up to 30% of the project financing required for the development of independent power projects. This debt financing mechanism, called the Private Sector Energy Development Fund, is expected to allocate some \$800 million towards the development of a number of independent power projects in Pakistan. The World Bank will contribute approximately \$146 million, and the balance will come from Japan, Britain, and several other countries.

Also, A.I.D. has developed financial analysis tools that can be made available to interested countries. In connection with supporting the Private Sector Energy Development Fund in Pakistan, A.I.D. contractors developed the PROJEV model, a Lotus 123 spreadsheet model. PROJEV is a financial analysis model that evaluates the economic and financial attractiveness of power projects. The PROJEV model was developed to test the impact of alternative financing arrangements on the economic attractiveness of power projects. The model was designed for use on Personal computers in developing countries and it was intended to be easy to understand, so that experienced Lotus 123 users can add calculations to the spreadsheet if necessary. The PROJEV model is used to evaluate the economic attractiveness of one or more proposed investments from the equity investor's perspective.

Also, in connection with its recent analysis of the potential for independent power from sugar mills in Costa Rica, A.I.D. has developed another financial analysis model for cane waste-fired cogeneration facilities.

D. Project Development Experience

The final type of A.I.D. activities can be classified as Project Development Experience. This includes support to specific independent power projects. These activities are designed to further the development of individual projects and programs. Activities in this area include feasibility studies and project design work.

A.I.D. Involvement with Specific Projects:

A.I.D. has been directly involved in a number of independent power projects around the world.

1. Proctor and Gamble Cogeneration Project, Philippines

A.I.D. helped finance the construction of the 4 MW cogeneration power plant for sale of excess power to MERALCO.

2. Kenya Geothermal Projects

A.I.D. is working with the U.S. Trade and Development Program and considering funding prefeasibility study of the potential for independent power from geothermal sources. Both large (on the order of 50 MW), grid connected projects and small (on the order of 5 MW), stand alone projects are being examined.

3. Indonesia Wood Waste Cogeneration

At numerous sites in Indonesia, A.I.D. has analyzed the potential for 1 to 5 MW wood waste fired generation systems to provide power and steam to the wood processing industry and to power for distribution by PLN, the state utility.

4. Sugar Cane Cogeneration Project, Dominican Republic

The Office of Energy has been approached by project developers to cost share the feasibility analysis for a 80 MW generation plant fired by bagasse and cane trash in the Dominican Republic.

5. Gas Turbine Projects, Pakistan

The Government of Pakistan has retained A.I.D. to assist in the preparation of a Request for Proposals for 100 MW of privately owned and financed gas turbine generating capacity in the Nandpur gas field.

6. Fluidized Bed, Coal-Fired Projects, Pakistan

The Office of Energy is working closely with three U.S. project developers who have proposed coal-fired fluidized bed combustions systems for from 55 to 120 MW at the Lakhra and Punjab coal fields in Pakistan.

7. Kenana Sugar Mill Cogeneration Project, Sudan

The Office of Energy is considering participating in prefeasibility analysis of the possibility of a cogeneration system based on bagasse and cane trash at the Kenana sugar factory in central Sudan that would export 15-30 MW of electricity to the Sudan National Electric Corporation, the state utility.

8. Costa Rica Sugar Mill Cogeneration Projects

Based upon favorable findings from prefeasibility analysis, the Office of Energy is prepared to discuss supporting further site specific feasibility studies for cogeneration systems at sugar mills in Costa Rica ranging from 1 to 100 MW.

9. Monymusk Sugar Mill Cogeneration Project, Jamaica

The Office of Energy has funded a feasibility study for a cogeneration system of at the Monymusk plantation in central Jamaica. A 20-25 MW plant appears feasible. Also, A.I.D. is funding the construction and field testing of special equipment for the collection of cane trash left in the fields to supplement the bagasse fuel.

10. Hub Chowki Diesel Power Project, Pakistan

A.I.D. supported the Karachi Electricity Supply Corporation by evaluating the independent power proposals submitted to the government for a 120 MW medium-speed diesel power station in Hub Chowki, 25 miles east of Karachi, where a large industrial estate is under development. FECTO, a Pakistani company, received a letter of intent for the project in mid-June. The project's total cost is estimated at \$60.4 million

11. Thailand Sugar Mill Cogeneration Project

The Nongyai sugar plant is planning to undertake minor modifications to enable it to generate approximately 10 to 20 MW of power in the off-season and sell the power to EGAT, the government-owned utility. A.I.D. is working with a private sugar mill and EGAT on the feasibility of selling excess power to the utility grid from the sugar mill.

The goal of our effort in assisting specific projects is to establish a number of successful pilot investment projects in A.I.D.-assisted countries that can serve as models for future investments on a broader scale.

IMPEDIMENTS TO INDEPENDENT POWER GENERATION

Based on our actual experience around the world, A.I.D. has found that numerous impediments have discouraged or prohibited the development of independent power in many countries. These impediments can be grouped into five categories:

1. Policy and Institutional Impediments
2. Weak Domestic Economies
3. Political Risk
4. Technical Risk
5. Financial Risk

1. Policy and Institutional Impediments

As mentioned, many of the initial barriers to non-utility participation in the power sector relate to public policies, regulations and practices in developing countries that prohibit or discourage private sector involvement. Before non-utility investment can take place policy issues such as the legality of independent power, level of import tariff rates, repatriation of profits, foreign ownership of companies, guarantees of payment on contracts and other matters, must be resolved.

Often the institutional structure of the power sector has been found to be resistant to change and very complicated, numerous government agencies are frequently involved in the planning, construction, procurement and operation of activities and facilities. In some countries, the personnel of the utility authority often lack adequate knowledge and training in the management and technical skills needed for the operation of utility systems, much less the skills needed to administer new private sector power agreements.

2. Weak Domestic Economies

In recent years, developing countries have experienced low economic growth, crippling debt burdens and monetary instability, reversing the hopeful trends of higher economic growth rates of the 1960's and the 1970's.

Economic growth in developing countries has slowed dramatically. For these countries, the World Bank estimates that the average annual growth rate of Gross Domestic Product has fallen from 6.4% during 1965-73, to 5.4% during 1973-80 and to only 3.6% during 1980-86. For independent power to flourish there must be a stable economic and investment climate.

3. Political Risk

The recent economic problems of some countries have only increased the level of political instability. Investors and financial institutions, when considering political risk, are concerned with (1) nationalization and expropriation, (2) inconvertibility of currency and (3) war and political unrest.

While sudden and outright expropriations receive more publicity, partial expropriation is of equal concern. This can take the form of excessive taxes, changes in regulations affecting ownership and operations, breach of contract, price and production controls, and profit-level restrictions. For electric power, which has a long tradition of public ownership and operation, the threat of possible complete or partial expropriation of independent power operations is even greater.

4. Technical Risk

Independent power project developers are generally able to assume, and expect to assume, the risk of the technical performance of their facilities. Nevertheless, there can be unusual and unexpected technical risks in some countries, such as the use of domestic, low quality fuel resources, the inadequacy of supporting infrastructure upon which their operations depend, the unavailability or disruption of fuel supplies, and the shortage of skilled operating personnel. Additional technical risks are involved when innovative power generation technologies are being considered.

5. Financial Risk

One of the most serious impediments to non-utility participation in electric power in developing countries is the risk of losing the equity and debt capital that must be invested in power system projects. The independent power sponsors are concerned that the unstable economies and governments of developing countries may result in their investments not achieving adequate rates of return, nonpayment of loans and possible uncompensated expropriation of assets.

In addition to the problem of the unavailability of external capital, raising capital within developing countries is often difficult or impossible due to the absence of local capital markets and the flight of local capital to foreign money centers.

LESSONS LEARNED FROM THE A.I.D. EXPERIENCE WITH INDEPENDENT POWER

As you can see, over the past few years, A.I.D. has had substantial experience in assisting developing countries to seek solutions to their power supply problems through independent power generation. This section summarizes the pertinent lessons learned from this experience.

General Lessons

- The independent power companies and project developers are seriously interested in making substantial, long term investments in power generation, as evidenced by the more than 80 proposals around the world.
- Independent power can reduce the national external debt burden in at least two ways: through the mobilization of domestic private sector capital, and through the introduction of off-balance sheet financing and direct foreign investment.
- With many developing countries devoting over 20% of their development budgets to the power sector, one of the most serious constraints to the expansion of power generating capacity in developing countries is the lack of adequate financial resources.
- The U.S. PURPA experience indicates that independent power producers, if provided an adequate price for power, can rapidly and effectively construct facilities and produce power.
- Full government support for independent power from all agencies and levels involved must be in place from the beginning, otherwise reluctant governmental units can easily retard progress causing significant costs for project sponsors.
- The government must recognize that there is a risk reward balance and that compensation is based on risk assumption. Developing country governments seeking to achieve the benefits of independent power must assume some level of risk and be willing to permit adequate compensation to project sponsors who are required to bear various project risks.

Institutional and Organization Lessons

- Before specific projects can be successful, there must exist a favorable policy and institutional climate for the participation of the private sector.
- In structuring the selection process for independent power projects, to the extent possible, application, approval and accounting procedures must be streamlined as much as possible to meet the needs of independent power producers for rapid decisions on funding requests and for minimal paperwork requirements.
- The institutional capability of governments and state utilities to implement an independent power program must be significantly enhanced in order to deal with the complex electricity pricing, project solicitation, and contractual agreement issues involved. Professional financial advisors and institutions with experience with nongovernmental project financing, capital market operation, project negotiation and project risk analysis are frequently needed to advise countries and their utilities from the beginning of the process of establishing the independent power program.
- Countries and their utilities must allow the independent power project proposers some flexibility in proposing solutions to power generation problems and in negotiating final project agreements.
- Experience by US utilities under PURPA has resulted in movement toward institutionalizing two means of procuring power from independent power producers:
 - Competitive bidding for small and medium size facilities that are relatively standard in size, design and system operation;

- Merit order selection, for larger, more complex projects, based on analysis of sponsor qualifications, price of power proposed, type of facility proposed, etc.

Financial Lessons

- To attract private sector participation and private capital, power purchase rates for independent power projects must allow sponsors to obtain adequate rates of return on their equity investments over the life of the project.
- After legal and technical obstacles have been overcome, obtaining long term financing at reasonable rates is one of the most significant problems facing independent power sponsors.
- For the substantial resources of export credit agencies to be available for independent power projects, there must be a solution to the conflict between their desire to have sovereign guarantees for their loan and loan guarantees and the desire of host governments to limit contingent liabilities that appear on their national balance sheets.
- Participation of individuals and companies from the host country as joint venture partners is frequently essential for successful project development.
- By introducing competitive market forces, it appears that independent power can result in improved efficiency of operation and allocation of resources, thereby reducing costs of operating specific activities and attracting new sources of investment capital from private financial markets that are not accessible to governments or government-owned enterprises.
- Given the high level of perceived political and financial risk, independent power sponsors from the host country and donor countries need financial assistance in developing projects, i.e. identifying implementable projects, understanding legal and administrative constraints, preparing prefeasibility and feasibility studies, negotiating essential agreements, and obtaining short and long term debt and equity financing.

A.I.D. PLANS FOR THE FUTURE

In this concluding section, I would like to briefly outline how A.I.D. plans in the future to assist countries that are considering independent power to help solve their electric power needs. Our resources will be targeted at four areas:

1. Improving the public policy and institutional climate for independent power in developing countries,
2. Facilitating development of independent power projects,
3. Assisting with financing independent power projects, and
4. Coordinating and focusing U.S. and international public and private resources to support independent power projects.

To promote policy reform and institutional development, A.I.D. is prepared to assist in the following activities:

- Preparation of country assessments of the potential for, and impediments to, independent power in developing countries.
- In-country workshops and conferences with government officials, utility officials and independent power representatives to develop acceptable approaches to private sector participation in the power sector, including information about the experience in the United States.
- Preparation of model and country-specific laws, regulations, guidelines, power purchase agreements and other materials to assist developing countries in implementing programs for private participation in the power sector.

- Establishment, with assistance from the electric power industry, of an Electric Utility Internship Program whereby utility personnel in developing countries can train directly with U.S. utilities and utility commissions.
- Analyses of the macro-economic impact of independent power in selected host countries.

To assist independent power project development, the Agency will be committing resources in these areas:

- Establishment of an independent power feasibility fund to share the cost of prefeasibility and feasibility studies of independent power projects in A.I.D.-assisted countries.
- Studies on planning, financial and legal issues in countries that need such assistance to advance independent power projects, such as least cost pricing studies, specific power technology studies, power purchase pricing studies, letters of intent, power purchase agreements, utility interconnection and operation studies.
- Brokering U.S. independent power projects proposed in developing countries by offering technical assistance to project sponsors.
- Establishment of an independent power technical assistance team and roster of power industry, utility and utility commission experts to dispatch to A.I.D.-assisted countries requesting assistance on specific matters concerning independent power.
- Maintenance of an independent power database of information about country policies, key contacts, project opportunities, U.S. suppliers of power equipment and services, and other matters and disseminate the information through an Independent Power Report.
- Definitional missions to selected countries to encourage the development of independent power projects.

In an effort to facilitate the financing of independent power projects, A.I.D. will be involved in the following:

- Analysis of possible financing assistance programs for independent power projects, such as loan guarantee programs, contract guarantees, and possible alternative loan security instruments for export credit agency and private bank lending program, such as sovereign guarantees, escrows, and bank letters of credit.
- Assistance to project sponsors to obtain equity and debt financing from Overseas Private Investment Corporation, the Export-Import Bank of the United States, the International Finance Corporation, the World Bank, the Interamerican Development Bank and others.
- Analyses of how capital markets in selected developing countries can provide financing for independent power projects.

Finally, A.I.D. will undertake efforts to improve the coordination of assistance programs available of independent power:

- Establishment of a task force of power industry, utility company, utility commission and project development representatives to advise the Office of Energy on its efforts to support independent power in developing countries.
- Establishment of cooperative action within the various U.S. government agencies and the U.S. investment community.
- Arrangement of cooperative activities on independent power with the multilateral development banks, bilateral donors and the international investment community.

In conclusion, I would like to say that we believe that independent power can make a significant contribution to alleviating the electric power problems around the world. A.I.D. stands ready to

assist in these efforts. Thank you for this opportunity to discuss with you A.I.D.'s experience with independent power.