

DOE/GO/10234-F

INTERNATIONAL POWER INSTITUTE

FINAL TECHNICAL REPORT



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Date: August 4, 2000

**Prepared for the United States
Department of Energy
Under Cooperative Agreement
No. DE-FC-36-97-G010234**

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OUTLINE

- I. Introduction
- II. Report on Tasks Statement
- III. Conclusion
- IV. Tabs
 - A. Brochure on IPI
 - B. Advisory Board Members
 - C. Report on the IPI Exploratory Visit to South Africa
 - D. Report on the IPI's Second Visit to South Africa
 - E. Raising Rural Incomes Through Distributed Power, Water and Telecommunications
 - F. Visit to Central America
 - G. Trip Report – Honduras and Nicaragua
 - H. Proposal for Training ESKOM Labor Union Leaders
 - I. Executive Summaries of Four Feasibility Studies for Honduras
 - J. Brochure on "Electrifying Africa '99"

**Final Technical Report for the
International Power Institute
CA-No. DE-FC-36-97-G010234**

I. INTRODUCTION

Morehouse College established the International Power Institute (IPI) in July 1997 with the assistance of a Cooperative Agreement grant from the Department of Energy of \$404,194 to help carry out its mission. This mission was defined as follows:

“The International Power Institute, in collaboration with American industries, seeks to address technical, political, economic and cultural issues of developing countries in the interest of facilitating profitable transactions in power related infrastructure projects. IPI works with universities, governments and commercial organizations to render project-specific recommendations for private-sector investment considerations.

IPI also established the following goals:

- Facilitate electric power infrastructure transactions between developing countries and the US power industry;
- Collaborate with developing countries to identify development strategies to achieve energy stability; and
- Encourage market driven solutions and work collaboratively with other international trade energy, technology and banking organizations”.

IPI also established the following strategy:

“IPI collaborates with recognized experts from throughout the country to form teams composed of all the essential disciplines needed to execute the projects it addresses. By working closely with national laboratories, other universities, consulting firms, power utilities, equipment manufacturers and others, it cost effectively pursues projects that facilitate development of American technologies in developing markets. IPI is driven by the understanding that electric power strategy must be considered in a context of the culture, geography and indigenous resource base, as well as the technical, legal and financial reality of the country. The enhancement of a developing country’s electric power system should be expected to impact positively or negatively in any market and non-market aspects of a populations’ quality of life. IPI’s work is conducted from a holistic perspective to assure that all-important financial and social effects are understood”.

The mission, goals and strategy statements are laid out in the Institute's brochure, which is attached to this report as Tab A.

Administratively, IPI was placed under the College's Center for International Programs, which was subsequently renamed as the Andrew Young Center for International Affairs. Professor Julius E. Coles was appointed as the Director of the Center and was also appointed as the Director of the International Power Institute. Dr. Terry Ferrar, who had previously served as a consultant to the College on the establishment of IPI was hired as the Institute's Deputy Director. In March 1998, Dr. Ferrar's contract was terminated due to various deficiencies in his performance. He was subsequently replaced by Dr. James H. Porter in September 1998.

In a letter sent out in November 1997, IPI invited a total of 20 distinguished people to join its Advisory Board. The invitees included power executives, engineering firms, universities, national research laboratories and legal firms working in the power sector. A total of 17 executives accepted IPI's original invitation. Subsequently, three other people joined the Advisory Board for a total of 20 members. A complete listing of the members of the Advisory Board is attached as Tab B. The first Advisory Board meeting was held in Dallas, TX in December 1997 with eleven Board members participating in this meeting. While the statement of work called for quarterly meetings, the Advisory Board felt that this was too frequent given this heavy demands already placed on their own work schedules and decided that the Advisory Board should meet semi-annually. At this initial meeting the Advisory Board gave its overall approval to the directions and strategy of IPI and recommended that the IPI focus its initial efforts on the South Africa and Mexico energy markets. During the life of the grant, the Advisory Board met for three additional times beyond the first meeting in Dallas as follows: December 8, 1998 in Orlando, Florida; June 1999 at Morehouse College in Atlanta, Georgia and on November 30, 1999 in New Orleans, Louisiana. At these meetings, the Advisory Board reviewed IPI's work program, financing possibilities and overall work progress.

II. REPORT ON TASKS STATEMENT

A. Tasks 1 and 2: Identifying Appropriate Electric Power Technologies and Strategies for the Sustainable Development of Electric Power in Developing Countries.

South Africa Exploratory Visit

From January 19 to 30, 1998, the IPI Director and a Board member made an exploratory visit to South Africa. The purpose of this trip was to gain a better understanding of the current economic and political environment in South Africa, obtain a picture of the energy situation and evaluate potential opportunities for future IPI projects. The IPI team visited Johannesburg, Pretoria and Cape Town. It talked to some 57 people at 28 firms or agencies in South Africa. Based on this visit, it was felt that the following appeared to be the most promising areas for IPI consideration:

- (1) With the changing mix of personnel in ESKOM, traditional labor relations are not always mutually shared. ESKOM stated that it wanted help from Morehouse College/IPI in the area of labor/management-training program (“mutual gains training”).
- (2) The two-unit Koeberg nuclear station was found to be experiencing the same challenge with spent fuel as U.S. nuclear stations. ESKOM expressed an interest in obtaining help to manage this spent fuel and a longer-term program to dispose or recycle it in an “environmentally safe” manner.
- (3) “Energization” of remote townships and villages until they can be grid-connected later was strongly supported by the Republic of South Africa’s Department of Energy and ESKOM. Such a project should encompass an integrated plan based on values added such as environmental credits, national social goals and technology demonstration and it could be based on developing local capabilities to install, operate, repair and manage these systems.
- (4) Neighbors of South Africa are both attracted to it for its large market for excess power from the prospective large generation projects in their own countries, but they are concerned also about South Africa, with its economic power, taking advantage of them. They have indicated a need for an “honest broker” to help bring these projects to fruition. ESKOM is aware of their concerns and would be pleased to cooperate with foreign firms organizations such as IPI in the development of some of these projects. This opportunity could provide a role for IPI with South Africa’s neighboring countries and there is a further potential for IPI to find foreign capital to invest in such projects.
- (5) While Demand Side Management (DSM) opportunities seem limited, there may be a role for IPI to play in peak shaving projects for a number of the municipal customers and for some of the larger industrial/commercial customers. Some IPI member companies have bad experiences with such technologies and one member has used diesel engines as both an emergency back up (for hospitals or industrial processes) and a peaking capacity resource for the utility company.
- (6) Manpower training is badly needed throughout the South African economy and it is a primary objective of the Government of South Africa and ESKOM. This need could provide an opportunity for Morehouse College and a broader opportunity for future IPI Projects.
- (7) ESKOM indicated its interest in becoming an important player in neighboring countries’ energy development projects. Such projects could include building transmission and/or distribution facilities or upgrading existing power facilities. All these countries are short of capital and technical capability. ESKOM could use foreign partners to help bring balance to such energy projects and to limit the amount of capital ESKOM diverts from uses in South Africa. Such joint ventures could include IPI.

- (8) ESKOM has indicated an interest in becoming a worldwide player in the electricity markets, but appears to feel more comfortable with an experienced and reputable partner. This could provide a role for IPI and its Board members in arranging such partnerships.
- (9) In all the energy related projects one value added that IPI can bring is the application of CO2 credits. This also could provide the basis for an IPI entrée into other projects not discussed above.

A copy of the report entitled "Report on the International Power Institute's Exploratory Visit to South Africa" is enclosed as Tab C.

Second Visit To South Africa

Between February 25, and March 12, 1999 IPI staff made a second trip to South Africa to determine the status of the Labor Training Proposal delivered to ESKOM in July 1998; seek other opportunities for services IPI could provide ESKOM; identify further marketing and technology opportunities for IPI in South Africa; host the "Electrifying Africa '99" conference jointly sponsored by PennWell, ESKOM, and Morehouse IPI; visit with universities and technikons to identify opportunities for student and faculty exchange and joint participation in energy related projects.

The Morehouse contingent on this trip were: Julius E. Coles, who led the first trip to South Africa; James H. Porter, the Director of IPI; John H. Stanfield, Chair of the Department of Sociology; Donald Vest, Professor of Economics; and Rene H. Males, Vice Chairman, IPI Advisory Board and Mr. Richard Ector, Board member and President of TVIG.

During the South Africa trip the IPI contingent visited Mr. David K. Mahuma, Deputy Director Electricity at the Ministry of Minerals and Energy in Pretoria. IPI had met Mr. Mahuma at the Sun City Conference. He brought in Mr. Andre Otto whose primary concern in the Ministry was the electrification of off-grid communities. Our concept for powering off-grid communities was explained to Messrs. Mahuma and Otto.

Following the advice of David Mahuma, IPI staff arranged an appointment and met with Dr. W.P. Burger and his wife, Dr. M. M. Van Zyl Burger. The Burgers are the principals of Curmo Design, Inc., and are educators and social scientists that have been involved in community development work for the most of their careers. They have focused their activities on South African communities with sub-standard living conditions, and building business enterprises within these communities. IPI's concept of using infrastructure to enhance community income was explained to them. IPI expressed its desire to work with them on future projects.

IPI also met with Mr. Gosling of ESKOM to follow-up on the labor proposal it had submitted in the summer of 1998. Mr. Gosling explained about the re-organization that ESKOM was undergoing and that the proposal was now in the hands of Mr. R.S. (Sully) Moloko, the

senior general manager at ESKOM. At a later meeting with Mr. Moloko, IPI alerted him to the fact that the proposal was in his department. He tracked it down and after a brief reading stated that no decision would be made until after the reorganization at ESKOM was complete.

In another meeting with ESKOM officials we described our concept of using electric power, water and other infrastructure to enhance community incomes to the extent that the infrastructure was affordable in the community. Mr. Buttle was interested in the concept. He declined to identify such communities in South Africa until and if IPI had a contract with ESKOM in place.

IPI staff and Morehouse faculty took several field trips to visit off-grid communities. These communities were not yet serviced with electric power although transmission lines ran directly overhead these villages and one village was hooked up to the grid but no power was turned on. These communities appeared to have limited resources, some land, and water availability varied from ground water resources in arid regions to adequate rainfall in villages near the major cities.

The IPI staff found on this trip that many of the contacts initially made were no longer in place, primarily because of the on going restructuring in ESKOM. However, great strides were being made in opening education and job opportunities to everyone. A number of townships and villages not yet served with electricity were also visited. Some even had distribution circuits and service drops installed but no electricity was flowing. IPI reached the conclusion that economic development is essential for the successful development of power infrastructure projects. ESKOM agreed with this observation but middle management was so overwhelmed with the issues before them that they seemed unable to act and unwilling to accept outside assistance. In general, IPI carried out the objectives of its mission although it was disappointed that its in-roads at ESKOM had not produced the results expected. For a detailed report on this second visit to South Africa, see Tab D.

Based on the two visits to South Africa, and especially to many off-grid rural communities, IPI in February and March 1999 devoted a considerable amount of time to developing a new approach to serving off-grid rural communities in the poorer areas of the world, especially Africa. One approach that was felt to be appropriate was to develop small-scale electric power generation units (generators, bio-digestion units) and other infrastructure (roads, water, communication and market centers) to help enhance income generation to pay for the off-grid electricity supplied to the communities. This particular approach was developed in cooperation with the Tennessee Valley Infrastructure Group (TVIG) and is referred to as the Integrated Infrastructure Platform (IIP).

Exploratory Visit to Central America

While IPI had initially looked at Mexico, it did not find a real opportunity for it to develop bankable projects in this country. IPI began to explore project opportunities in Central America in view of the lack of identifiable projects in South Africa and Mexico in line with IPI's commitment to seek out electrification opportunities in developing countries worldwide. In conjunction with the Tennessee Valley Authority (TVA), IPI supported the trip of a consultant

Mr. Robert Blenker, who along with Mr. Gene Gibson of the TVA visited five Central American countries in search of opportunities to install an Integrated Infrastructure Platform (IIP) to provide electric power, water and telecommunications to remote villages. The trip took place between June 21 and July 1, 1999. The team visited Guatemala, El Salvador, Costa Rica, Honduras and Nicaragua. The trip was especially appropriate because of the major damage to Central American infrastructure caused by Hurricane "Mitch". The trip was additionally appropriate because USAID had made available Indefinite Quantity Contracts (IQC's) for providing rural agricultural infrastructure in Central America and IPI wanted to explore the opportunity to respond to this program. The first conclusion reached on this trip was that the concept of Integrated Infrastructure Platforms is well accepted by government, private sector and utilities. Project opportunities were found in Honduras and Nicaragua. Consequently, IPI began to plan for a subsequent trip to solidify relationships with both private sector partners and government advocates with hopes of negotiating contracts with private sector representatives and memorandum of understanding (MOU's) with government officials. A second conclusion drawn from the Central American trip was that although USAID had available IQC's for rural infrastructure development in Central American, the funding had to come from the country missions, who have already committed most of their funds to other projects. Further, it was felt that there would be a long lag time for funding projects. Nevertheless, in order to get into the funding pipeline, IPI, as a subcontractor joined the team of TVIG, TVA and Chemonics and assisted in preparing a proposal for USAID consideration. Chemonics held the Indefinite Quality Contract and thus served as the instrument for submitting the proposal. The purpose of the proposal was to establish a framework to assess the potential of communities to benefit from the installation of IIPs and to encourage the private sector to invest in such projects. A copy of the proposal entitled "Raising Rural Incomes through Distributed Power, Water and Telecommunication" can be found in the attached Tab E, but it was never acted on by USAID. For details on the exploratory visit to Central America see Tab F.

As a follow-up to the trip made to Guatemala, El Salvador, Costa Rica, Honduras and Nicaragua in June/July 1999 to seek out electrification opportunities for the proposed Integrated Infrastructure Platforms (IIPs), the International Power Institute (IPI) and its partner organization the Tennessee Valley Infrastructure Group (TVIG) made another visit to Honduras and Nicaragua from October 18 through October 27, 1999. The main purposes of this trip were to: a) identify a strong commercial contact in each country to champion IIP's in the region; b) obtain clear support for IIPs from government officials in the forms of Memorandums of Understanding and letters of support; and c) develop a strategy which will result in a sale of equipment and the installation of a least one IIP in either Honduras or Nicaragua. The team was very successful in Honduras in that it found strong support for the IIP concept from Commercial Laeisz. In addition, the team identified a target community, Cantaranas, where the IIP concept could be applied. A potential co-investor for the project and a large commercial energy client, the Tres Valles Sugar Mill, was also identified. The visit to Nicaragua was not as successful, since a strong commercial ally could not be identified during this trip to support the IIP concept. As a result of this visit, IPI and TVIG made plans to carry out a detailed feasibility study of the Cantaranas project. Details on this visit can be found in Tab G "Trip Report – Honduras and Nicaragua".

B. Task 3: Serve as a Consultant on the Identification and Implementation of Appropriate Electric Power Technologies

ESKOM Proposal for Training Labor Union Leaders

In June 1998, the IPI received an official request from ESKOM, the Electric Power Company of South Africa to develop a proposal to train labor union leaders on a short-term basis (one-month) and a long-term basis (three-months) in the areas of economics, democratic unionism and leadership. While the training envisioned did not involve electric power technology transfer, it was felt to be essential to develop a long-term relationship with ESKOM to develop other projects.

The proposed training program was designed to meet several as follows:

- Reduce Union/Management conflict by:
 - Identifying pressing problems;
 - Developing the structure for orderly process in addressing problems and negotiating differences; and
 - Helping union leaders identify their responsibilities.
- Prepare organization for potential changes (e.g. competition, restructuring or privatization) by:
 - Enhancing union leaders knowledge and understanding of basic economics and world trends in the electric utility industry, labor practices, union operations; and
 - Strengthening union leaders' ability to "lead".
- Strengthen and stabilize ESKOM's union organization by:
 - Developing union leader's capabilities;
 - Providing union leaders with understanding and practice in labor relations practices;
 - Identifying needs for further development and training; and
 - Enhancing the credibility of union leaders.
- Provide ESKOM, labor leaders and South Africa capability for a leadership role in Southern Africa labor relations by:

- Demonstrating a role model of union/management relationship development; and
- Using a basic program as a “replicable” model for other industries and other countries.

The detailed proposal developed for ESKOM can be found attached as Tab H, but it was never acted on by ESKOM’s leadership due to changes in the top leadership of the company and the reorganization of the company.

Honduras Project Development

Building on the two previous trips to Central America, IPI acting in a consulting capacity with Tennessee Valley Infrastructure Group (TVIG) focused attention in March 2000 on project sites in Honduras. TVIG’s Integrated Infrastructure Platform (or IIP) combines water and electricity production in a single integrated unit, thereby providing both products at a lower cost than could be attained for each one separately. Because of the unmet demand for clean drinking water and electricity in remote towns throughout the developing world, the need for such units was felt to be widespread the previous visits to Honduras had resulted in strong in-country commercial interest, support in the form of memorandums of understanding by key government agencies and identification of four prospective project sites for IIP installations.

From March 5 to March 15, 2000 representatives from the TVIG, Tennessee Valley Authority (TVA), IPI, and a market research firm International Business Initiatives (IBI) conducted an intensive survey of project opportunities in the four communities to establish how IIPs might help these four communities enhance their economic development and meet their electric power needs.

A summary of the specific project site studies follows and executive summaries for each of the pre-feasibility studies for the four sites are included as Tab I.

Cantaranas

Cantaranas is a small community where drinking water, electric service, and sewage treatment are inadequate, even though it is only 70 km from Tegucigalpa. The team met the Mayor, community leaders, and the manager and engineers at the local sugar mill (the major industry in town); and surveyed virtually all of the businesses in town with a team of 8 Honduran interviewers. Findings included the following:

- Electric power suffers from frequent outages, which render businesses that depend on electricity less viable.
- The sugar mill supplies its own electricity during the half of the year when it processes sugar.
- The only safe drinking water is bottled water from Tegucigalpa.

- The road from Tegucigalpa to Cantaranas is presently in terrible condition, partly as a result of hurricane Mitch.
- Sewage is dumped with minimal treatment into a local stream, or into crude, poorly designed septic systems.

Several opportunities were identified for more careful evaluation:

- The use of TVIG's cogeneration process to supply electricity and drinking water locally. The economics depend on the size of the bottled drinking water market, changing rules for the Honduran electric company's power purchase price, and whether a local private sector investor - who is interested in the soon-to-be deregulated power sector as new business area - will find the prospect profitable.
- The application of TVA's patented ReCip sewage processing system, which TVIG is offering as one of an integrated set of services. It uses easily constructed ponds that are smaller than those in conventional sewage treatment plants. Sites and raw materials were identified, and the economics depend on the municipality's ability to develop the necessary funding for construction.
- Two potential hydroelectric sites were examined; one may be economic if prior uses for water for irrigation can be accommodated.

IPI's objectives were met in this project, as:

- Power and power-related projects were identified and evaluated.
- US firms, notably TVIG and TVA, expanded their awareness of opportunities and of market conditions in general with Cantaranas, and their relationship with key decision makers there.
- As an educational skill-enhancing process, the mission clarified not only the ways in which new technology might be applied locally, but also institutional mechanisms, involving local businesses, by which the economics can be feasible. An investor exists who can carry out the project, but other prospective activities might absorb his attention.
- Advisory services involving technical and business issues were provided not only to the US firms (IPI, TVIG, TVA and IBI), but also to the local entities in their consideration of options.

Trojes

Tied tenuously to the rest of Honduras by 70 km of wretched road, Trojes is a small, isolated town on the Nicaraguan border. Findings include the following:

- Coffee production is the major prosperous economic activity, but high energy prices – for example for coffee drying – and difficult transportation have presented coffee, other crop production and ranching from attaining their full potential.
- The water is agreed by all to be unacceptable, as it contains not only fecal material from cattle uphill from the intake but also lead according to one informant.
- The water is frequently turned off, which results in higher illness rates during the rainy season when water pressure cannot keep soil contamination out of the distribution system.
- The electricity supply from Nicaragua is unreliable and it is reported that the national electric company may provide a used diesel set to provide power. Fuel supply over the bad road will be a problem.

The same interview team visited Trojes to assess water and electricity needs, and a meeting with coffee growers revealed that the financial resources probably exist among them to finance power-water project. However, even though the municipality operates its own electric distribution system (unique in all of Honduras, and only because the power comes through Nicaragua) operating power systems is not an activity that coffee growers are comfortable with.

Examination of three potential hydro sites also suggested that at least one might supply all of the town's electricity needs. It is located so far away that the water could not be used for municipal water, and costs of electric transmission will be a factor in the plant's economics. The other two, closer sites could provide a portion of the needed electricity. To assist in evaluating these hydro sites, guidance was provided on stream flow measurements to the municipal utility and to the owner of the hydroelectric site, who is also one of the coffee growers.

Finally, based on discussions with the Trojes coffee growers the possibility of drying coffee with waste heat is being investigated. This would make electricity cheaper and more reliable in Trojes, and would enable growers to dry their coffee locally rather than sending it 100 km to Danli.

As in Cantaranas, IPI's objectives were met in Trojes:

- Power and power-related water projects were identified and evaluated. Related to energy needs is the poorly maintained road that approaches Trojes.
- The four US firms involved, IPI, TVA, TVIG and IBI expanded their awareness of opportunities and of market conditions in general within the municipality, and their relationship with key municipal and agricultural decision makers there.
- As a skill-enhancing process, the mission clarified not only the ways in which these new technologies might be applied in Trojes, but also institutional mechanisms such

as municipal power generation or a cooperative, also involving local businesses, by which the economics can be feasible.

- IPI and other team members provided advisory services involving technical and business issues, potable water supply, wastewater, and hydroelectric site feasibility.

Utila

Utila is an island off Honduras' north coast, where water is supplied by an over drafted system of private and municipal wells, and where the national electric utility, ENEE, supplies electricity 18 hours per day with diesel sets on the island. Sewage is not treated, or flows mostly to private, crude septic systems. One concern is the effect of both oil and sewage pollution on the coral reefs that supply the tourist attraction that is the island's main source of income.

To supply their electricity needs from midnight to 6 am, hotel typically run their own diesel generators, creating a very inefficient use of fuel. For the other eighteen hours of the day, a quirk in Honduran law sets the electricity price on Utila way below the mainland price rather than above it as the actual costs suggest; for various reasons including fuel transport, the cost of diesel generated power on Utila is quite high. Observers expect this quirk of high costs and low prices to be changed in the upcoming privatization of the electricity sector. The present ENEE power plant is disgracefully ugly on the otherwise scenic waterfront, and everyone in town the team spoke with said that they would like some other arrangement for electricity. Discussions with business leaders elaborated on some options, including solar, the TVIG integrated electric water supply design, improved sewage treatment options and wind power.

As the only one of the four locations with a respectable wind resource and with what will be high costs of privatized power, Utila offers the prospect that wind power could make privatization economically feasible.

In the Utila activity, IPI's four objectives were met as follows:

- Project opportunities were identified for joint water-electricity production, wind power, solar, vastly improved sewage treatment; and the economics and next steps necessary were discussed in a meeting with some of the major economic forces in town.
- IPI contributed to discussions covering the TVA and TVIG products, and offered implementation advice on wind and solar power.
- IPI and the team provided background and educational assistance to decision-makers in areas of electric power, solar and wind energy.
- The IPI team also provided advisory services to businesses, a possible principal investor, and the municipality on financial and technical issues.

El Paraiso

El Paraiso is a small community on the north coast (not to be confused with the Department of El Paraiso in southern Honduras), where a sophisticated investor already understands the electricity and water markets he wishes to supply. As such, the IPI/TVIG team supplied data this investor needs to make his decision, along with further information on what turns out to be an excellent hydroelectric site located near El Paraiso. IPI provided preliminary estimates of its potential, and provided technical background so that the site's stream flow can be evaluated more precisely.

An IIP is still a potentially good investment in El Paraiso, but the pre-feasibility study is less extensive because the market conditions for both water and electricity depend not on local economies but on the purchase price of electricity on the national grid and on conditions for the export market to which the water will be sent.

Current Status of Projects

As a result of the International Power Institute's financial support and involvement, the Integrated Infrastructure Platform (IIP) for the Honduran island of Utila project has progressed to the point of a commitment for 100% of the equity (\$625,000) by a consortium of US and Honduran investors. The unit will be wind-diesel hybrid, having an installed capacity of 750 kw of wind turbines (3 x 250 kw) and 2040 kw of diesel (3 x 680 kw), plus a waste-heat (co-generation) water distillation unit for seawater desalination. The island's current electrical distribution system only provides service to half the island's population, and the service (when operating) is only 18 hours per day.

The new service for Utila will extend coverage to 97% of the island's population and will provide 24-hour per day service. The normal base load for the island after grid extension will be approximately 500 kW, and the expected peak during the first year is 1200 kW. The unit is designed so that the renewable energy component will carry the full base load (when the wind is blowing) with one or two diesels operating as necessary to carry the peak load. One diesel will be in hot standby or undergoing maintenance. The design reliability for the unit as a whole is 97%.

The Utila IIP will be barge mounted and located in a lagoon site, with raw water for both cooling and distillation being drawn from the lagoon side and discharged via a dispersion header to the Caribbean Sea side. The Honduran government is procuring all applicable permits and expected closing on the financing is September 2000. Production of the unit will begin in September and be complete in the US by January 2001, and the unit should be installed and operating by March 2001.

In regard to the Trojes project, the Honduran government has authorized funding a full technical design and business plan development for an IIP municipality of Trojes. This is a direct result of IPI involvement and support. Trojes has several small rivers that appear to have excellent small-hydro potential, although there are concerns over control of the watershed area that feeds these streams.

IPI, TVIG and the Tennessee Valley Authority analyzed the small hydro and other potential for this site as a part of the study. The Honduran Government also has a private sector individual ready to invest in this project.

C. Task 4: Establish Markets for US Technologies

On December 2, 1997, IPI staff participated in a US Trade and Development Agency and Department of Energy sponsored briefing for 20 African Electric executives in Washington. IPI made a presentation on its mission, strategy and goals for working with developing countries in the power sector. In addition, IPI co-hosted with the Capstan Corporation and Parallax Company a luncheon for Africa Electric power executives at the Annual Power Gen Conference on December 8, 1999 in Dallas, Texas, to explore marketing and investment opportunities in Africa as a whole.

In November 1998, IPI attended a Pan African Conference at Tennessee State University in Nashville to present its concept, Integrated Infrastructure Platform (IIP), on electrification and infrastructure development for small to medium sized communities. The concepts were well received by the conference.

On March 23, 1999, IPI and TVIG met in Chattanooga, Tennessee with African utility executives from Ghana, Senegal and Mozambique, to explore electrification of off-grid communities using the IIP approach. This meeting helped to explore various marketing opportunities in West Africa. On March 15, 1999 another meeting was held with the IFC in Washington to explore further marketing concepts in Africa.

On March 3 - 4, 1999, the IPI in cooperation with PennWell, Power Engineering and ESKOM organized a major conference entitled "Electrifying Africa 99", which was held in Sun City, Republic of South Africa. A brochure for this conference is attached at Tab J. Approximately one hundred delegates attended this first of a kind conference in sub-Saharan Africa. Mr. Julius Coles, the IPI Director, moderated the keynote session, and at the invitation of IPI, former Secretary of Energy, Hazel O'Leary gave the keynote address. In addition, Dr. James Porter chaired the session entitled "Distributed Power Generation and Infrastructure Systems for Remote Locations," and Dr. Donald Vest gave a presentation on doing business in Africa. Three other presentations were made at the conference by IPI Advisory Board members – TVIG, Cummins Engine and the MCX Energy and Environmental Corporation. As a consequence of this first conference, Mr. Coles and Dr. Porter of IPI, Mr. Siisi Adu-Gyamfi of Cummins Engine, Mr. Richard Ector of TVIG and Mr. Sharieff Mustakeem of MCX Energy and Environmental Corporation have all joined the planning group with the PennWell Corporation to plan for new "Electrifying Africa '2000" that is planned to be held in Accra, Ghana.

In May 1999, IPI attended the Corporate Council on African Summit held in Houston, Texas. The theme of the meeting was barriers to capitol acquisition and how they may be overcome. The meeting was attended by Prime Ministers, Finance Ministers and Energy Ministers from many countries in sub-Saharan Africa. At the meeting, IPI had the opportunity to

present the concept of Integrated Infrastructure Platforms to the ministers from Senegal, Côte d'Ivoire, Mali, Ghana and Nigeria.

In September 1999, IPI along with the Tennessee Valley Infrastructure Group made contact with the Government of the Côte d'Ivoire about IIP possibilities. As a result of these discussions, the Ministers of Energy sent letters to the Trade and Development Agency suggesting that they provide a grant to IPI and TVIG to send a team to the Côte d'Ivoire to assess village communities that might be suitable sites for IIP's. Later on TVIG and IPI submitted a joint proposal to the US Trade and Development Agency for a grant to carry out feasibility studies on the provision of electricity and other basic services through IIP's for five sites in the Côte d'Ivoire, West Africa. The proposed projects will include power from hybrid renewable and fossil generating sources, as well as water purification, wastewater treatment and economic development components. The grant was approved in December 1999, but a coup d'état in the Côte d'Ivoire in late December has resulted in a hold being placed on these studies. The new Côte d'Ivoire government has expressed willingness to pursue the projects, but the US government is taking a wait and see attitude toward the new government at the present time. It is expected, however, that these feasibility studies will be carried out once the US Government hold is lifted.

IPI also attended the Department of Energy sponsored African Ministers Conference that was held in Tucson, Arizona from December 13 -15, 1999, to market its capabilities and off-grid energy strategy to various African governments. IPI's efforts were concentrated on the Côte d'Ivoire, Ghana, South Africa, Nigeria and Uganda delegations.

III. CONCLUSION

IPI was successfully established in July 1997. During the three-year period covered by this grant, IPI, in collaboration with various representatives of the energy sector in the United States, sought to address the technical, political, economic and cultural issues of developing countries in order to facilitate profitable transactions in power related infrastructure projects. This original mission statement has been proven to be a good and accurate statement of what IPI's overall mission should be. In order to help IPI carry out this mission, an Advisory Board was established to provide overall direction and policy guidance to IPI. This Board was composed of 20 members and included representatives from power executives, engineering firms, universities, national research laboratories and legal firms working in the power sector. This Advisory Board was very helpful in assisting IPI to define its strategy, select the geographical areas of focus and provide it with needed expertise to help carry out its work. While the Cooperative Agreement called for quarterly meetings, the Advisory Board decided that this was too frequent, given the heavy demand on the members work schedules, and made the decision that semi-annual meetings would be more appropriate. The Board also recommended that IPI focus its attention on South African and Mexico. IPI could not identify bankable projects or interesting initiatives in Mexico, so it decided to focus its attention initially on the vast South African energy market.

IPI made two visits to South Africa to identify possible energy projects and to develop a strategy for working in South Africa and in neighboring countries. On the basis of the initial visit, some nine substantive work areas were identified which IPI felt provided it with potential projects. Since the power sector is controlled in South Africa by a monopoly ESKOM, IPI spent a large part of its visit exploring various areas of cooperation with ESKOM. Out of all the areas identified, ESKOM felt that it needed help from IPI to develop a proposal to train its labor union leaders in the areas of economics, democratic unionism and leadership. While this request did not involve a power project or technology transfer possibilities, IPI felt that it should respond to this request in the interest of developing a long-term relationship with ESKOM and with a view that this could lead to other power projects. IPI developed an excellent proposal for ESKOM's consideration, but the leadership of ESKOM changed and the company's new leadership never acted the proposal on. IPI spent a large amount of its time trying to develop a relationship with ESKOM, but there was too much turn over in the company's leadership and the company was subsequently re-organized under different leadership from what IPI had been dealing with. All of this delayed the development of projects in South Africa during the first two years of the grant. In fact, IPI probably spent too much time in South Africa and did not spend enough time exploring other African or Latin American countries with the perspective that a bankable project could probably be developed faster in South Africa.

In June 1999, IPI decided to turn its attention to the Central American countries that had been damaged by Hurricane "Mitch". Therefore, an exploratory visit was made to five Central American countries, including Guatemala, El Salvador, Costa Rica, Honduras and Nicaragua to investigate needs and potential projects. Based on this trip, it appeared that IPI's concepts of an Integrated Infrastructure Platform (IIP) had potential for the development of possible energy related projects. On a subsequent visit, IPI narrowed its focus to Nicaragua and Honduras, but felt that Honduras offered the greatest potential to transfer US technology and to develop bankable energy projects. In March 2000 IPI and representatives from TVIG, TVA and the International Business Initiative (IBI) conducted an intensive survey and pre-feasibility studies of the energy needs in four communities in Honduras, Cantataranas, Trojes, Utila and El Paraiso.

The completed pre-feasibility studies on Honduras have resulted in an investment being confirmed for the Utila project. A consortium of US and Honduran investors has decided to provide 100% of the equity (\$625,000) needed to bring this project into fruition. The project will include a wind-diesel hybrid with an installed capacity of 750 kW of wind turbines (3 x 250 kW) and 2040 kW of diesel (3 x 680 kW) plus a waste heat (cogeneration) water distillation. The current service for Utila only covers one-half of the island's population for 18 hours a day. The proposed new service will provide coverage for 97% of the island's population and will provide 24-hour per day service. Production of the unit is scheduled to begin in September and will be completed by January 2001. In addition, the government of Honduras has authorized funding a full technical design and business plan development for an IIP in the municipality Trojes. This authorization should lead to another investment by US and Honduran investors in a power project.

While it took IPI more time than expected to deliver a bankable project this has now happened. It also now appears that IPI has found a niche in the international energy market for small-scale energy projects that provide an off-grid source of power as well as related

infrastructure (water, telecommunication, cold storage, waste, etc) for people living in poor rural communities in both Central America and Africa. The four feasibility studies carried out in Honduras appear to indicate that there are other energy projects available in Honduras and neighboring countries that could utilize the IIP approach. In addition to the inroads made in Honduras, it also appears that the Côte d'Ivoire is interested in the IIP concept. As soon as the political hold is lifted on the US Trade and Development Agency in the Côte d'Ivoire, IPI can initiate pre-feasibility studies in this country. Four project sites have already been identified.

IPI's partnership with TVIG and other energy related businesses has worked out very well. While IPI would have liked to use more of its faculty and students in these pre-feasibility studies, the students and faculty academic schedules have not permitted them to fully participate in these studies. Likewise, the Honduran studies required people with Spanish language skills, which were difficult to find with the appropriate technical skills. Nevertheless, IPI hopes to make great use of faculty and students as it moves ahead with the planned feasibility studies in the Côte d'Ivoire and other countries in West Africa and Central America.

In regard to the marketing for US Technologies, IPI from its inception was able to market its organization as well as some of the smaller energy technologies and companies at various conferences involving African countries. IPI was present and played a key role in the marketing of US technologies at the Department of Energy's conference that was held in Washington in 1997, the Corporate Council on African Summit held in 1999 the Department of Energy Conference that was held in Tucson, Arizona in December 1999 and other conferences held in various parts of the US. In addition, IPI was a co-sponsor with PennWell, Power Engineering and ESKOM of a major conference held in Sun City, South Africa on "Electrifying Africa '99". Some 100 delegates attended this conference from various African countries and the US. Companies from the US were given the opportunity to exhibit their equipment and new technologies.

In summary, IPI's achievements can be listed as follows: 1) establishment of a distinguished Board composed of members of energy related companies, research organizations, universities and legal firms; 2) development with the Tennessee Valley Infrastructure Group (TVIG) of an Integrated Infrastructure Platform (IIP) to bring electricity to off-grid communities in developing countries; 3) carrying out of feasibility studies for the application of the IIP model at four sites in Honduras which has already lead to US and Honduran investment in the Utila project and the prospects are excellent for another investment in the Trojes project; 4) completion of a study of project opportunities for South Africa in cooperation with ESKOM; 5) development of a detailed proposal for training ESKOM labor union leaders in democratic unionism, leadership and economic concepts; 6) establishment of relations with various universities and technikons in South Africa; 7) co-sponsorships with PennWell of an energy conference entitled "Electrifying Africa '99" and the planning for a new and larger conference to be held in Ghana in August 2000; and 8) exploration visits were carried out in Honduras, Guatemala, El Salvador, Costa Rica, Nicaragua, South Africa, Côte d'Ivoire and Ghana.

In April 2000 IPI submitted another unsolicited proposal to the US Department of Energy (DOE) for a follow-up grant for the International Power Institute to continue to carry out the strategy and mission initiated under this Cooperative Agreement. Morehouse College believes

the initial success by IPI cited in this report warrants continued support from the Department of Energy.

A

International Power Institute



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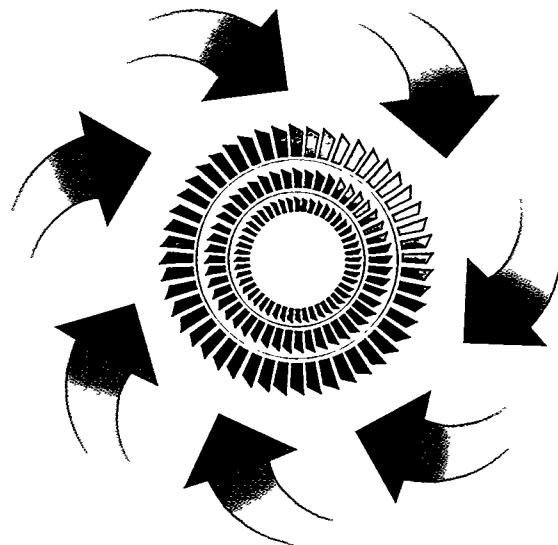
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The International Power Institute is supported by
a grant from the Department of Energy.



*Dedicated to Identifying
Power Development Strategies
and Helping to
Bring Power Related
Infrastructure Projects
to the World.*

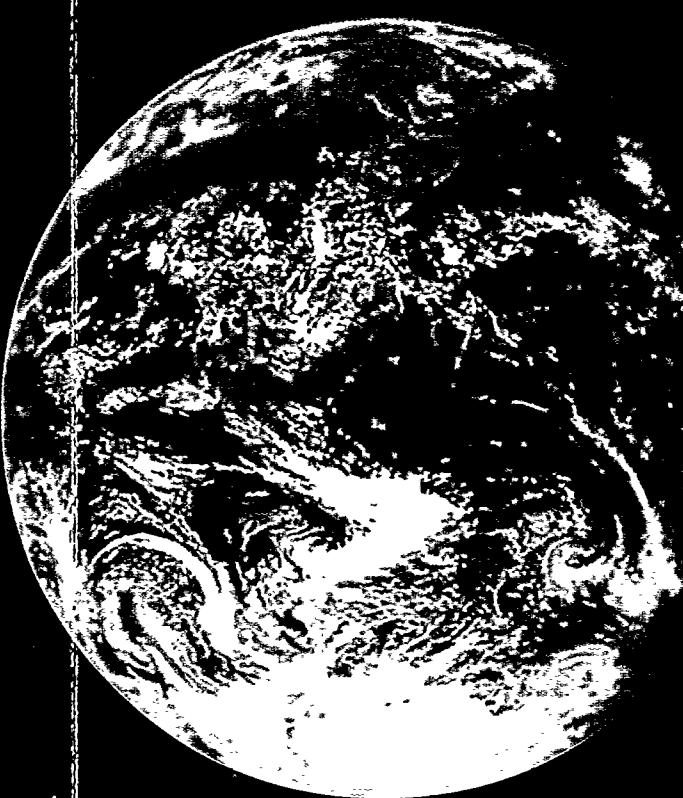
Mission

The International Power Institute (IPI), in collaboration with American industries, seeks to address technical, political, economic and cultural issues of developing countries in the interest of facilitating profitable transactions in power-related infrastructure projects. IPI works with universities, and government and commercial organizations to render project-specific recommendations for private-sector investment considerations.

IPI strives to:

- ◆ *Promote improved standards of living, energy security and environmental enhancement;*
- ◆ *Contribute to the development of regional power delivery systems;*
- ◆ *Support increased fuel and supplier flexibility, and encourage the commercialization of advanced power and transmission technologies;*

- ◆ *Facilitate understanding between U.S. industry leaders and their government and business counterparts in developing countries on issues such as political, cultural and business customs; and*
- ◆ *Utilize its non-profit, university-based structure to provide an "honest broker" function in the interest of encouraging mutually beneficial cross-border transactions.*





The IPI will play an important role in developing power projects to enhance the quality of life for the people in the developing countries.

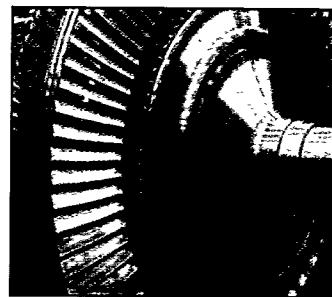
— Walter E. Massey
President, Morehouse College

Morehouse College & IPI

Morehouse College

has a proud tradition

of producing leaders



who consistently address issues relating to the betterment

of humanity. By way of IPI — which is an institute within

the College's Center for International Programs —

Morehouse is collaborating with other academic

institutions, government laboratories and private

industries to focus attention on international opportunities

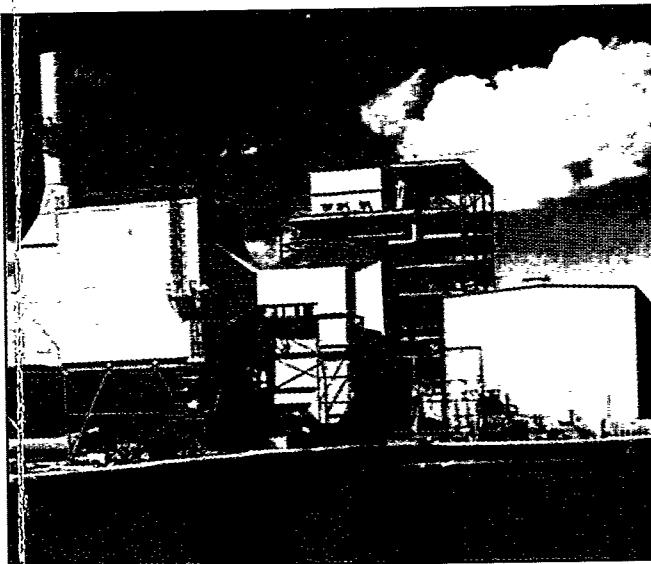
for financially sound power and infrastructure projects

for investment consideration.

Goals

IPI's goals are to:

- ◆ *Facilitate electric power and infrastructure transactions between developing countries and the U.S. power industry;*
- ◆ *Collaborate with developing countries to identify development strategies to achieve energy stability;*
- ◆ *Encourage market-driven energy solutions; and work collaboratively with other international trade, energy, technology and banking organizations.*



IPI's Strategy

IPI collaborates with recognized experts from throughout the country to form teams composed of all the essential disciplines needed to execute the projects it addresses. By working closely with national laboratories, other universities, consulting firms, power utilities, equipment manufacturers and others, it cost-effectively pursues

projects that facilitate deployment of American technologies in developing markets. IPI is committed to identifying and developing sustainable transactions for various power projects.

IPI is driven by the understanding that electric power strategy must be considered in a context of the culture, geography and indigenous resource base, as well as the technical, legal and financial realities of the country. Electric power is like few other commodities or services. The enhancement of a developing country's electric power system should be expected to impact — positively or negatively — many market and non-market aspects of a population's quality of life. As such, IPI's work is conducted from a holistic perspective to assure that all important financial and social effects are understood.



B

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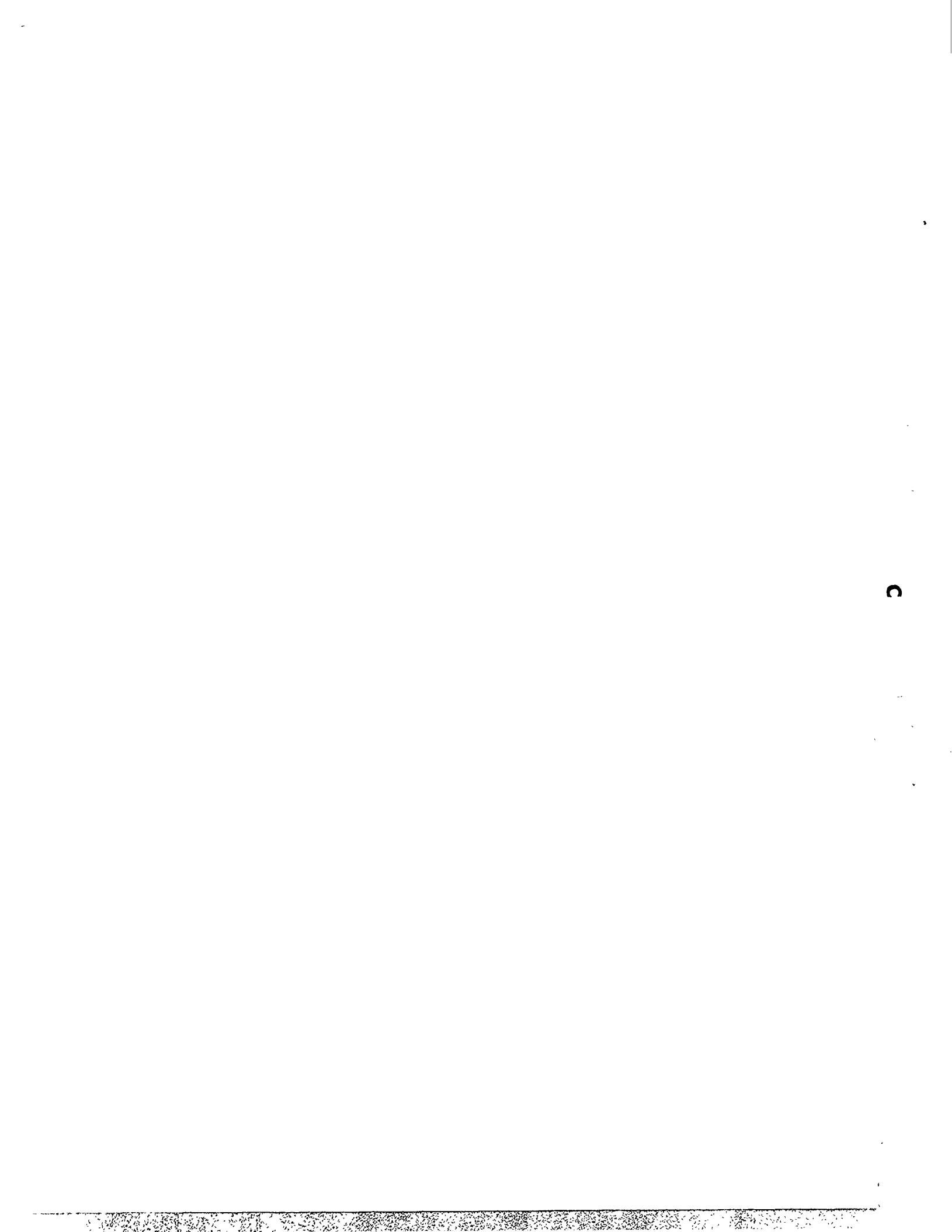
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REPORT ON THE INTERNATIONAL POWER INSTITUTE'S

EXPLORATORY VISIT

TO

SOUTH AFRICA

PREPARED BY

**JULIUS E. COLES
AND
RENE H. MALES**

INTERNATIONAL POWER INSTITUTE

**MOREHOUSE COLLEGE
MARCH 1998**

IPI EXPLORATORY VISIT TO

SOUTH AFRICA

SUMMARY:

South Africa is a large country with a relatively advanced infrastructure, but where there exists a number of energy and other type projects which could be done by the International Power Institute (IPI) or its members. An exploratory visit to South Africa identified nine such project areas for possible cooperation.

The level of expectation among the disadvantaged people in South Africa is very high so that there is a need to respond quickly by accelerating economic growth. There also is a need for intensive education and training so that the disadvantaged population can enter the productive labor force or, if already employed, move upward in the economy.

The South African Government recognizes the need for foreign capital and technology, but they have not moved aggressively to attract such investment as a result of their concern over the potential loss of control over their economy.

Purpose

IPI initiated its first country exploratory trip by having its director, Julius Coles, and an Advisory Board Member, René Malès, visit South Africa for the period from January 19 to 30, 1998. The purpose of this trip was to gain a better understanding of the current economic and political environment in South Africa, obtain a picture of the energy situation and evaluate potential opportunities for future IPI projects.

They spent the majority of the time in Johannesburg but also visited Pretoria and Cape Town. In all they talked with some 57 people at 28 firms or agencies (see Exhibit I.) Also, they obtained a substantial amount of literature on South Africa, particularly on energy issues, and talked with innumerable people during dinners, walks along the street, etc. While this is not an exhaustive sampling of this large and diverse country, it does provide a fairly sound basis for the conclusions which follow.

THE COUNTRY:

People, Economics and Politics

South Africa has a population of about 45 million and is about the size of Texas and California combined. It is by far the most prosperous of the sub-Saharan African countries with an average annual per capita income of some \$3,000. This high income level had been in decline since 1985 but started growing again in 1993. Nevertheless, growth slowed in the last two years as annual population growth continued at 2% but GNP declined from a target of 3 to 4% to just over 2%. Achieving a higher economic growth rate remains one of the government's major goals.

However, this wealth is distributed very unevenly. About 35% of the population lives below the poverty line. Nearly half of the population lives in rural areas or small towns while the other half lives in metropolitan areas of 50,000 people or more. Migration to the cities for better opportunities is a major challenge. Meeting the expectations created by the change from minority toward majority rule is also a critical challenge. Crime is perceived as pervasive and is a severe problem, particularly in the major urban areas. Much of the commercial property and better housing is protected with high walls, razor wire, locked gates and guards. The security business is booming.

South Africa's population is composed of 77% Africans, 12% White, 8.5% Coloured and 2.5% Asian. Although, with the end of apartheid, economic and social opportunities have been opened to the entire population and even though progress in achieving greater equal opportunity has been remarkable (for example, 30% of ESKOM's managerial and professional ranks are now filled by formerly excluded groups), there remains a wide gulf between expectations and achievement. A few Blacks and Coloureds have become very successful but many remain mired in poverty. Unemployment in the poor Black townships (cities for Blacks) runs well over 50%. Providing basic training and education for these people as well as upgrading the skills of other previously disadvantaged people is another major goal of government. Many commercial establishments still cater to one racial group or another, but there is access for everyone who can afford it.

The US has once again become a major trading partner with South Africa, but still lags behind the UK, Germany and Japan. South Africa's economy, which once depended almost entirely on extractive industries and agriculture, has become quite diverse. English is the most widely understood language. Prior to the 1994 elections, only English and Afrikaans were official languages of the

country. There are now 11 official languages although many more dialects and variations are spoken, particularly in the rural areas.

South Africa is a parliamentary democracy with a President as the executive Head of Government. There is a National Assembly of 400 seats that is lead by the largest party, the African National Congress. The South African legal system is based on English Common Law and Roman-Dutch law. The country's transition to majority rule and its current stable situation has been helped by the charisma of President Nelson Mandela. The impending presidential elections of 1999 are viewed with both hope and concern. President Mandela is expected to step down and his probable successor, Executive Deputy President Thabo Mbeki, has been viewed as a more ardent socialist. However, Executive Deputy President Mbeki's recent speeches seem to endorse the country's present economic strategy and objectives.

Electrical Markets

ESKOM, the national electric utility, is the fifth largest utility in the world and has traditionally been self sufficient and has not sought further expansion outside the southern African market. During the apartheid years, ESKOM was not very active in international power organizations. This has been changing in the last ten years.

ESKOM is principally a wholesaler to municipal utilities although it serves directly over 30,000 major industrial and commercial customers and has a little under 2 million direct service residential type customers. ESKOM has a generating capacity of 38.5 GW to serve a current peak load of 28 GW. This capacity is primarily in coal-fired stations. ESKOM owns 23 stations: 13 coal stations, a two unit nuclear unit power plant, two gas turbine stations and two owned hydro facilities plus other hydro facilities owned by others. A number of the coal units have been put on cold stand-by for future use although many doubt that these units will ever go back into service because of the large capital cost to bring them up to current operating requirements and their high operating cost.

The transmission system is based on 400KV grid with one line at 765KV and substantial additional transmission at 275KV. This system is tied to neighboring country grids by which ESKOM sells about 2.5% of its output and is contemplating participation in future out-of-country major generation projects. ESKOM's rates are among the lowest in the world. Its wholesale and industrial prices average about 2¢ per kWh and domestic prices are around 4 to 5¢.

The mix of ESKOM's 40,000 employees is in the midst of rapid change. ESKOM is providing buy-outs for employees who find qualified replacements from the

previously disadvantaged people. It is seeking to provide accelerated training and development for these disadvantaged people so that in the future there can be a more representative work force at all levels.

ESKOM views itself as the only legitimate generator of electricity for South Africa even though some of the municipal distributors have generating plants. For example, in the last decade Cape Town decided to build a pumped storage plant to help manage their peak time charges. ESKOM fought this plan in the courts, but Cape Town finally succeeded in winning approval for the project. However, ESKOM does see itself participating in generating projects in nearby countries to help those countries grow and to expand its own share of the market.

Because of ESKOM's low rates and traditional monopoly position, there are very few Independent Power Projects (IPP) projects in country. Conservation and efficiency programs among customers are not high priority except as a way of helping people to afford the cost of electricity. There is interest in mitigating peak usage charges but little incentive to do so. ESKOM has an active marketing program to help in the country's economic development and to utilize its own excess capacity.

One of the government's major economic development objectives is to provide electrical connections to the disadvantaged population who are not now served. These include almost all of the lower income people in rural areas and many of the poorer townships which have grown up around the major metro areas.

ESKOM has a goal of electrifying 300,000 homes per year and has achieved this goal for the last three years. By doing the easiest first, they have connected over 1.5 million homes since 1991. However, with a connection cost of about \$700 per home, 80 to 90 kWh use per month and problems with non-payment, the program is not breaking even. A number of innovative steps have been taken to improve the program economics. In addition, with subsidies and grants from the South African Government, ESKOM and Norway, a program has been underway to provide electricity via photo-voltaics to isolated schools and clinics in rural areas.

US Firms

There are a relatively large number of U.S. firms operating in South Africa. Nearly 90 of these firms are Fortune 500 companies. The markets in which U.S. firms operate are quite diverse and include: financial services, pharmaceutical products, business services, construction, mining, materials handling, consumer product manufacturing and distribution, hardware and household equipment, computer and office equipment and direct retail operations.

Some U.S. firms have had great success in the South African market; others have little to show for their effort. One notable success is Coca-Cola that re-entered the South African market in 1992 after a ten year absence. It is now dominating the South African soft drink market. McDonalds and Kentucky Fried Chicken can be seen in the major metro areas. The Mellon Bank appears to be successful in the financial markets.

CONCLUSIONS:

The South African Government welcomes foreign investment but has not moved aggressively to attract such investment as a result of their concern as to the potential loss of control over their economy. One of the government's highest priorities is putting more of South Africa's disadvantaged population to work. Projects that involve using local labor, developing local people skills and enhancing domestic assets are receiving much more favorable attention than those using mainly foreign resources.

Need for Training, Capital & Technology

Finding gainful employment for the 15 million or so unemployed workers is the critical challenge for South Africa. Projects that utilize local labor in a sustainable, long-term way are highly prized. Much of this available labor is inexperienced, lacking basic skills, work habits and essential job skills. Therefore, projects planning to capitalize on this labor asset must include appropriate training and local sustainable development components.

Another a prime objective of the South African Government is to promote disadvantaged people into executive, managerial, technical, supervisory, white collar and skilled trades positions. Therefore, programs to develop such skills among existing disadvantaged employees are of great importance to companies and agencies and could be viewed as a positive attribute for proposed investments.

The South African Government recognizes the importance of the acquisition of overseas capital to supplement locally available funds. While there is need for foreign capital, the government prefers investments that eventually will be turned into local South African ownership. Similarly, ESKOM is willing to share investment opportunities with foreign firms, but it appears to be unwilling to give up its control over these projects in South Africa, where it enjoys a virtual monopoly, nor over projects in neighboring countries. Even for projects outside South Africa, ESKOM would prefer to have control over development and operation of the venture.

Finally, many people in South Africa are proud of their domestic technological accomplishments, especially during the time they were economically isolated from the rest of the world and believe that they have all the capabilities needed to make their economy grow. Many others recognize the need for imports if South Africa is going to meet its growth objectives. Again, there is a great desire that such technologies eventually be integrated into the South African economy.

ESKOM's Role

ESKOM, the major player in the South Africa electricity market, has been reaching out to overseas firms (for example, joining EPRI several years ago and opening offices in London and Atlanta) but has not moved aggressively to invest internationally. ESKOM staff feel confident that the company has both the technology and knowledge to solve their problems even though they are willing to discuss partnership arrangements with foreign firms. Some staff added more recently are less confident about ESKOM's internal capabilities but are equally concerned about the company's ability to maintain control over investment projects with foreign involvement.

The Case for Opportunities

Even though South Africans have some concern about the need to control investment by foreign firms, there is a strong desire to get joint projects initiated promptly to get the country's economy moving forward even faster. Staff of the Department of Energy has been directed to welcome foreign investment projects that target getting electric power to the underserved population, promote employment and develop manpower skills. The Government has voiced its desire to be kept informed of such projects.

For projects affecting ESKOM's sphere of influence it is not mandatory to get their approval but, without ESKOM's cooperation, projects would be very much more difficult to execute and might not be possible at all. ESKOM welcomes project proposals in the difficult rural underserved areas but it is protective of its generation/transmission monopoly in South Africa. On the other hand, it appears to be willing to join others in non-domestic generation/transmission proposals.

Because of the low cost of electricity in South Africa, conservation/efficiency projects are going to be difficult to design to be cost effective. Yet, ESKOM's peak pricing tariffs may provide an opportunity for peak shaving or peak smoothing projects.

The Opportunities

South Africa has a considerable capability in the energy area but there is both a need and a willingness to consider foreign investment and foreign company participation in energy projects. There are already many interested foreign firms investigating such opportunities. The key for IPI to be successful is to bring unique assets which add value to a project. IPI has several such assets:

1. *Credibility as an honest broker related to its academic base.*
2. *Close relations to technology institutions and additional funding possibilities from the Department of Energy (DOE) for applying new technologies.*
3. *Source of added value from CO2 credits through The International Utility Efficiency Partnerships.*
4. *Experience base through IPI members in technology, engineering, construction, operations, financing and management.*
5. *Acceptability by South African agencies and companies which will be needed to become a partner on internal and external investment projects..*

The challenge will be to bring IPI's skills and values to play and to package projects so that they will have long run sustainability within South Africa's local environment. Based on the observations and discussions held during this exploratory trip the following projects appear to have near term potential for IPI:

1. *With the changing mix of personnel in ESKOM, traditional labor relations are beginning to experience problems. Expectations and goals on both sides of the table are not always mutually shared. A request from ESKOM is expected in the near future asking Morehouse College/IPI to propose a labor/management training program (what we term "mutual gains" training.)*
2. *The two unit Koeberg nuclear station is experiencing the same challenge with spent fuel as U.S. nuclear stations. ESKOM is interested in obtaining help to manage this spent fuel and a longer term program to dispose or recycle it in an "environmentally safe" manner. Independently, a South African promoter approached the IPI representatives to propose such a project.*
3. *"Energization" of remote townships and villages until they can be grid connected later is strongly supported by the Department of Energy and ESKOM. Such a project should encompass an integrated plan based on values added such as environmental credits, national social goals and technology demonstration and it should be based on developing local capability to install, operate, repair and manage these systems. ESKOM is already doing this now for schools and clinics with photovoltaic technology.*
4. *Neighbors of South Africa are both attracted to it for its large market for excess power from the prospective large generation projects in their own countries, but they are concerned also about South Africa, with its economic*

power, taking advantage of them. They have indicated a need for an "honest broker" to help bring these projects to fruition. ESKOM is aware of their concerns and would be pleased to cooperate with foreign firms in the development of some of these projects. This could provide a role for IPI with South Africa's neighboring countries and there is a further potential for IPI to find foreign capital to invest in such projects.

5. *While demand side management (DSM) opportunities seem limited, there may be a role for IPI to play in peak shaving projects for a number of the municipal customers and for some of the larger industrial/commercial customers. Some IPI member companies have experience with such technologies and one member has used diesel engines as both an emergency back up (for hospitals or industrial processes) and a peaking capacity resource for the utility company.*
6. *Manpower training is badly needed throughout the South African economy and it is a primary objective of the Government of South Africa and of ESKOM. This major need could provide an opportunity for Morehouse College and a broader opportunity for future IPI projects.*
7. *ESKOM has indicated its interest in becoming a important player in neighboring countries' energy development projects. Such projects could include building transmission and/or distribution facilities or upgrading existing power facilities. All these countries are short of capital and technical capability. ESKOM could use foreign partners to help bring a balance to such energy projects and to limit the amount of capital ESKOM diverts from uses in South Africa. Such joint ventures appear to be feasible under the IPI umbrella.*
8. *ESKOM has indicated an interest in becoming a world-wide player in the electricity markets but would appear to feel more comfortable with an experienced and reputable partner. This could provide a role for IPI and its members in arranging such partnerships.*
9. *In all the energy related projects one value added that IPI can bring is the application of CO2 credits. This also could provide the basis for an IPI entrée into other projects not discussed above.*

Next Steps

To follow up on the opportunities identified on this exploratory trip, the following actions need to be taken:

- a. *Morehouse College/IPI needs to develop a response to the ESKOM's expected request on labor relations training. IPI also should begin to identify members who might want to participate in such a training program.*
- b. *This report needs to be circulated to IPI Advisory Board members for their reactions and interest.*
- c. *If IPI members are interested in participating in any of the potential areas listed, IPI needs to initiate the steps required to develop a responsive proposal. This could involve a project team visit to South Africa to develop potential project sites.*
- d. *IPI needs to follow-up on this exploratory visit with another trip to South Africa to identify in further detail project opportunities and to further cement the relationships initiated.*

THE COUNTRY:

Initial Impression

South Africa (SA) is a large country at the southern tip of Africa, surrounded on three sides by water leading to a long coastline of nearly 2000 miles. The country's nearly 500,000 square miles make it a little larger than Texas and California taken together. Its temperate climate ranges from highveld grasslands, bleak semi-desert, to tropical swamps. The area is divided into 9 provinces (see Exhibit 2) of varying size. Most of the South Africa's 45 million people live in the eastern region where the better soil and rich minerals offer more job opportunities. The highest concentration of people, over 2.5 million, can be found around Johannesburg with the Cape Town area following with nearly as many people (see Exhibit 3.)

The impression one has upon arriving in Johannesburg is one of reaching a major developed country metropolitan center. The airport is full of 747's and large Airbuses from many airlines. It is connected to the city by a series of modern expressways. The only hint of poverty are a number of former African townships in which small houses are squeezed together but even these communities look neat and orderly.

In Johannesburg itself, one is struck by all of the walls around the more affluent properties and the fact that most of these walls are topped with razor wire. Security appears to be an issue and everyone talks about it. The newspapers are full of crime stories: robberies, rapes, gang activities. Yet the outward appearance everywhere is of strict order.

The affluent parts of the city are undergoing a major building boom with construction cranes appearing throughout the city. The center of the city is commercial space with rings of residential and commercial space going outward with islands of major commercial centers. The further out one goes, the space becomes dotted with light manufacturing and finally with some large industrial complexes. One is reminded of a relatively new European city.

A mixture of races can be found almost everywhere and this is a radical change since the end of apartheid. One also notices that Blacks, Coloureds and Asians hold a lot of the menial jobs and there are few, if any, whites holding these jobs. As verified later in this paper, much progress has been made in South Africa in overcoming the long traditions of discrimination and apartheid.

Cape Town is similar to Johannesburg except it is smaller and its setting is by the sea surrounded by hills. The central city reminds one of San Francisco.

Pretoria, on the other hand, reminds one of a dusty Midwestern capital in the U.S. What is not easily visible from these three cities is the virtually undeveloped, poorer regions in some of the rural areas of the country. There are touches of shanty towns on the outskirts of some of the townships and the poorest townships consist of a large number of one room square homes built one against the other.

History

The original population of hunter-gatherers turned to pastoralism some 2000 years ago and became the Bantu-speaking people of the central and western part of the African region. On the other side of the African continent, the Nguni (Zulu & others) migrated down the east coast of Africa.

Dutch settlers came to the cape area in 1652 and this little settlement grew, spreading with farming toward the interior. Living in isolation they developed a form of separation from the Blacks living in the interior of the area. As competition for grazing land grew, frontier wars erupted between the Blacks and the Dutch settler communities in 1779.

In 1795 Britain annexed the Cape region. It reverted back to the Batavian Republic in 1803 and it was re-occupied by the British in 1806. As immigration grew and pushed settlers further into the interior, battles broke out between various factions and the colonists. The discovery of diamonds in Kimberley in 1867 and gold on the Witwatersrand in 1886 changed the face of southern Africa. What had been a colonial backwater became a thriving, valuable colonial possession. New immigration helped create sizable Jewish, German, Greek, Portuguese and Italian communities.

Rising tensions between the British and Dutch settlers led to a series of battles starting in 1899 finally ending in 1902 with a decisive victory for the British. Negotiations led to the creation of The Union of South Africa in 1910, a self governing dominion within the British Empire with the majority Blacks excluded from governance. This exclusion led to the formation of the African National Congress (ANC) in 1912 as the primary political organization in the fight for majority rule.

During the next 40 years, South Africa transformed itself into a modern industrial nation. Most Afrikaners came together under the banner of the National Party to protect their language and culture from the black majority and to gain

independence from Britain. In 1961 South Africa left the British Commonwealth and became a republic.

During this period the country's racial policies became increasingly restrictive and the separation policy became known as apartheid. Soon after independence, the ANC formed an armed wing and embarked on a campaign of resistance and violence to overthrow the apartheid regime. This led to the arrest and imprisonment of Nelson Mandela on Robben Island off Cape Town. Under Hendrick Verwoerd (who was assassinated in 1966), BJ Vorster and PW Botha there were attempts to reform apartheid while tightening internal security. In 1976 black schoolchildren in the Soweto Township began to resist openly the imposed apartheid rules, leading to a violent confrontation known as the Soweto uprisings. Successive attempts to control the Black population completely by force failed to restore law and order, resulting in much civil unrest throughout the country.

By the 1990's, under the leadership of FW de Klerk, the futility of trying to maintain apartheid became apparent and a consensus grew for change. South Africa then recognized the ANC and the South African Communist Party, released Mandela from prison and entered into negotiations. South Africans went to the polls as a united nation for the first time in 1994. The ANC won the election by a wide margin and Mandela became the country's first Black president on May 10, 1994. Immediately after the election, all sanctions were lifted, South Africa rejoined the Commonwealth and two years later a multi-party Constitutional Assembly produced a constitution that was signed into law in 1996.

President Mandela has announced his intention to retire after the parliamentary elections in 1999 and his presumed successor is Thabo Mbeki, the current Executive Deputy President. Executive Deputy President Mbeki has had a reputation of being an ardent socialist and there has been concern expressed that he may cause the country to move to the left. However, in his role as Deputy President, he has endorsed the country's free market course which has now been set and has seemed less of a socialist than his reputation had led people to believe. There is much hope that President Mandela, who is widely respected by the White minority as well as those of other races, will remain in the ANC as a senior statesman and moderating force to help the country remain on its free market, non-socialist path.

People

South Africa's population of about 45 million (there is some question on this statistic, some sources state the population is as low as 41 million, but a new

census should resolve this uncertainty) had been growing until recently through immigration and from an internal growth of about 2% per year. While still growing internally, emigration started to exceed immigration in 1994 (see Exhibit 4) and the loss continues today. Europe is the principal source of immigrants from where nearly half come (see Exhibit 5). Europe and Oceania are the major destinations of emigrants (see Exhibit 6.)

Of the total population, 77% are Africans and 12% are White. The balance is made up of 8.5% Coloured and 2.5% Asians (see Exhibit 7.) Race is still an important designation among the people of South Africa and, while economic activity is becoming more integrated, most social activities are still divided along racial lines.

Before the general election of 1994, there were only two official languages: English and Afrikaans. Now there are 11 official languages (see Exhibit 8) although English remains the most widely spoken language and Afrikaans is commonly spoken among the business community particularly in the Western Cape region but also in Johannesburg and Pretoria.

The average annual per capita income in South Africa is about \$3,000. This makes South Africa the most prosperous country of Sub-Saharan Africa. Beginning in 1985 per capita income began to decline as political instability grew. Since 1993, however, it has begun to grow once more. Continuing and accelerating this growth remains a major goal of the government. With population growth continuing at 2% per year, the government is planning to increase real GNP growth to 5% per year by the year 2000. Recently, rather than growing rapidly at the currently desired rate of 3 to 4%, GNP growth has declined to a rate near 2% per year (see Exhibit 9.) It is estimated that the growth rate was about 2% again in 1997.. This has become a great cause for concern among the country's leaders.

Income is distributed very unevenly among the various regions of the country with many areas living in poverty while others are living very comfortably. About one-half of the country lives in rural areas or in towns of less than 50,000 (see Exhibit 10.) Because of the expected opportunities in the major urban centers, there has been migration to these centers but the opportunities have not grown at a sufficient rate to meet expectations. Exhibit 11 shows the percentage of individuals living in poverty by province. For the country as a whole, about 35% of the population live in poverty. But even in the Western Cape and Gauteng (Johannesburg metro area), poverty rates are about 20%.

Economy and Foreign Investment

Unemployment in some of the poorest townships runs about 60% or more, although this figure includes some of the self-employed. Nationally, the unemployment rate is close to 30% (see Exhibit 12.) With the election of the ANC to head the government in 1994, there was an expectation among many of the disadvantaged people that they would soon get to share in the riches of South African. Progress to date has been slow as noted above. Many disadvantaged people are becoming disappointed because of this failed expectation and it is not clear how long the government has to solve this challenge. Therefore, finding work for these unemployed people and meeting at least some measure of the expectation for the improvement in the standard of living are among the highest priorities of the government.

The economy, which at one time was based mainly on agriculture and mining, has changed dramatically. Even though South Africa has substantial reserves of many important mineral resources (see Exhibit 13), the economy now has become greatly diversified (see Exhibit 14.)

Private sector fixed investment has been growing rapidly while public corporation and government sector investment has grown very little (see Exhibit 15.) Government and the public corporations have been forced to devote a growing share of their budgets to transfer payments rather than to long-term job creating investments. These two sectors represent over one-third of the economy thereby explaining some of the reason for the shortfall in growth objectives.

The economic growth rate has been impacted by the high rate of inflation fueled by uncertainty. As can be seen on Exhibit 9, the rate of annual inflation has come down from over 15% to close to 5% as the changes in political structure provided for greater credibility in the government. Nevertheless, the Rand has continued to erode in value compared to the Dollar (see Exhibit 16) reflecting both the higher inflationary rate in South Africa than in the US and the major uncertainty about what is going to happen in South Africa both politically and economically.

The government has expressed a desire for foreign investment. Nevertheless, the signals remain mixed as the South Africans worry about losing control over their economy to foreigners. The government has put pressure on firms, particularly foreign firms, to meet other goals such as greater ownership of business by and better jobs for the disadvantaged people. While these goals are important, it provides a mixed signal as to how welcome foreign investment really is.

Yet, many foreign firms are active in South Africa. The American Chamber of Commerce in Johannesburg lists 260 firms in their membership. Some American firms enjoy an excellent reputation in South Africa. For example, Coca Cola, after its 1992 reentry in South Africa, has won plaudits from both government and the private sector as an exemplary firm. Some firms seem to have found their South African niche. Others have a presence but are not doing business and have not been active in seeking business. Still others are looked down upon as unprepared to enter the South African market.

Overall, foreign investment in South Africa has more than doubled between 1989 and 1995 according to the South African Reserve Bank (see Exhibit 17.) Some care should be taken in using these data since the data is not consistent with that from Pretoria University which appears in Exhibit 15. Nevertheless, it is evident that foreign firms are returning each year to the South African markets in increasing numbers and with greater investments. This illustrates that there are opportunities for foreign firms, albeit with substantial challenges, in meeting the growing needs of the South African market.

ELECTRICITY MARKETS:

ESKOM

The national electric utility, ESKOM, is the fifth largest utility in the world as measured by kWh sales (see Exhibit 18), larger than the largest US utility, TVA, by nearly 30%. Until recently this utility and their management were isolated from most of the rest of the world. By force, this caused them to develop capabilities in all areas of operation in order to be self sufficient. To the extent that South Africa would like to acquire more foreign technology and capital, the tendency at ESKOM to reject foreign ideas could be a barrier to this national goal. The staff at ESKOM is aware that their size and the size of the market region under ESKOM control confers the ability to be self sufficient. They are rightfully proud of their accomplishments and capabilities.

With the government pushing ESKOM to fulfill a greater public role and with constraints on capital resources, ESKOM is beginning to open up to foreign investment and technology. Its joining of EPRI several years ago is symbolic of this change in attitude. Similarly, it has now joined with EDF and Midlands Electric in a distribution experiment providing electric service to a disadvantaged population in one of the former townships.. They are actively pursuing other joint ventures in different areas of utility operations.

ESKOM Customers

ESKOM is primarily a wholesaler, with 752 "Redistributors" as shown in the 1996 financial statements (see Exhibit 19.) Sales to these redistributors represent over 40% of the 165,000 GWh ESKOM sold to all customers in 1996. Many cities and towns use their electric power supply system as a method of subsidizing other services. Therefore, the rates charged to the end consumer can differ substantially from one locality to another. Some distributors are quite efficient; others are ill prepared for their responsibilities.

Currently, there is a government review of the South African distribution system. Many believe that the recommendation of the government review panel will be to reduce the number of distribution systems substantially. There are those who believe that the reduction may be to even as few as a dozen systems but other observers think it more likely to end up with 30 to 40 systems. Some believe that ESKOM may be asked to run these new distribution systems; most believe that something like the English model will be used with independent distributors eventually prepared for the possibility of being privatized.

In addition to serving these distributors, ESKOM has a substantial direct end service business. The combined "Industrial" and "Mining" classes of customers utilize nearly half of all ESKOM output. ESKOM is now, by the end of 1997, serving 2 million "Domestic" customers. The rapid growth in this class of customer represents ESKOM's commitment to electrifying 1.2 million homes by the year 2000. They are now providing service to 300,000 customers per year in areas not previously served by electricity.

ESKOM also provides direct service to customers classed as "Rural", "Traction" and "Commercial". While two of these classifications represent large numbers of customers, none represent much more than 2% of ESKOM's total sales.

The four "International" customers are ESKOM's four closest neighbors: Botswana, Mozambique, Namibia and Zimbabwe (see Exhibit 20.) Sales to these four more than doubled between 1995 and 1996 and increased again in 1997, now representing about 2.5 % of ESKOM's output. However, as discussed below, if and when the several large power generation projects in these countries are completed, the flow of electricity will have to reverse since these projects depend on South Africa to be the sink for the excess power that will be created. On the other hand, ESKOM sees growth potential in these countries and is looking for ways to benefit from such growth when it takes place.

Transmission Grid

The grid shown in Exhibit 20 shows the Southern Africa "Power Pool" area. ESKOM represents about 80% of the energy in the pool and is clearly the dominant player among the 12 interconnected countries. Neighboring utilities both value the resources ESKOM can bring but also believe that they are so dominated by South Africa that they feel that they have had to accept less than equitable deals.

There are several renegotiations on-going on power contracts to buy-sell or to "wheel" (the transmission of power over the owner's line from a selling party to a buying party). Some of these negotiations have been going on for several years without coming to closure. There is also the possibility of large generation projects in neighboring countries but these depend on ESKOM taking a majority of the output during the first part of the life of the projects, the host country not having sufficient load to justify the project alone.

One of these projects is based on the use of the newly developed gas fields in southern Namibia. It is the impression of some that South Africa would rather import the gas and convert it to electricity within their own economy as well as

use it for other applications. Another such project is a large hydro-electric facility in southern Zimbabwe.

ESKOM's internal grid is based on 400 KV lines (see Exhibit 21.) One 700 mile line at 765 KV has been constructed but $\frac{1}{4}$ of the line is operated at 400 KV. One 700 mile 533KV direct current (DC) line also is in operation. Technical people at ESKOM are interested in expanding such DC lines to provide the long distance transport of power to and from neighboring countries. However, the ESKOM staff also recognizes that neighboring countries need to expand their local transmission grids, making DC applications unlikely to be practical.

The prior transmission grid voltage was 275 KV and a substantial transmission system still operates at that voltage. What we would call "sub-transmission" and they call "distribution" operates at a nominal 132 KV or 88 KV with some lines as high as 165 KV and as low as 33 KV. "Reticulation" lines, or what we would call "distribution", operate primarily at 22 KV. The services operate as a 220/240 V, 50 cycle system.

ESKOM Generating System

ESKOM's generating system is primarily coal fired. It totals 38.5 GW of nominal capacity and is rated at a maximum capacity of 36.5 GW to meet a peak load of 28 GW. Twenty-six coal units with a total capacity of 4.5 GW at four power stations have been placed in reserve storage. Some at ESKOM believe that these units will be reactivated some day to meet growth in load. Others believe that these units will never be brought out of storage but that additional load will be met with new units on the system or in neighboring countries. Economics will eventually decide this issue.

Seven of the 13 coal fired stations are 3000 MW or larger, consisting of multiple units of the 600 MW class. Two of these large stations use dry cooling, one of the largest applications in the world of this technology. In total, these coal fired stations burn 85 million tonnes of domestic coal per year which cost about \$7 per tonne. This is the principal reason for ESKOM's very low costs, which are discussed in a section which follows.

The balance of the capacity is made up of two gas turbine stations, two major hydro plants and several smaller ones, two pumped storage schemes and one two-unit nuclear station with a capacity of 1840 MW.

Of the nearly 180,000 GWh generated in 1996, 91% came from the coal units and 6.5% came from the nuclear station. Unit availability in 1996 was 90.6%,

considerably higher than in any of the last ten years. System load factor was 71.5%, slightly lower than in any of the last ten years.

ESKOM Tariffs

Despite sharp increases in prices in the last several years, electricity prices in South Africa remain among the cheapest in the world. ESKOM's low cost of generation, stemming from its low cost of coal, is the primary reason for its low rates. Further tariff revisions are expected in the next few years. Rather than being aimed at raising total revenue, these revisions will target getting tariffs to more closely mirror costs. As Exhibit 23 shows, the overall average cost of power sold by ESKOM is 11.3 Rand cents per kWh. This is about 2.3 ¢ in US currency, using the current exchange rate of 5 Rand to the Dollar. Even the directly served small customers are paying an average of 20 to 25 Rand cents per kWh or 4 to 5 ¢.

What this table does not show is the mark-up taken by the redistributors who serve the vast majority of domestic and small commercial customers. As noted earlier, these charges vary widely. These charges must cover the distribution functions and the low load factor of most of these customers. Moreover, the charges are generally structured to provide the municipality or township a large profit margin to cover other costs. This results in rates that are as high as 1.5 to 2 times ESKOM's retail rates. Even at 6 to 9 ¢ per kWh, these tariffs compare favorably to most around the world but not to neighbors who are directly served by ESKOM. Reducing these disparities in rates is one of the issues that must be resolved if a change is made to the present method of redistribution.

One interesting disparity is that most redistributors whose loads are primarily residential have a very low load factor, well below 50%. Yet ESKOM's system load factor, including a large amount of high load factor industrial load, has traditionally been close to 60%. This provides little incentive for ESKOM to peak shave but there should be a large incentive for many distributors to peak shave. As noted earlier in this report, Cape Town built a pumped hydro facility to shave its peak but the project was opposed by ESKOM, which does not need much additional system peak shaving.

Because of ESKOM's adequate capacity and low rates, there are few IPP ventures contemplated in South Africa. On the contrary, ESKOM is actively promoting load building to use up its excess capacity. Electrification of the economy as a whole is a major goal of the utility.

Electrification of the Unserved Areas

Less than 50% of the homes in South Africa are served with electricity. The great majority of the rural areas remain unserved but so do many of the poorer townships close in to major metropolitan centers. The government has insisted that something be done about this and has charged ESKOM with the primary role. ESKOM has set itself a goal of electrifying 1.2 million homes by the year 2000 with a current pace of completing 300,000 homes per year. Exhibits 24 & 25 show this goal and the progress so far.

The program has taken on the easiest and most attractive projects first. That is, the conversions have been in townships close in to metropolitan centers at the highest end of the relative economic scale. Even so, major challenges have appeared in trying to make this program self sustaining.

The first of these is that the capital cost of connecting these customers, even with the simplest and lowest cost systems, remains higher than can be sustained by the customer's current use. The cost of connection is about R3,500; with an annual carrying charge of 15% (this may be higher than that used by ESKOM) this would result in a capital cost of R525 per year. Typical average monthly use at 80 to 90 kWh has remained lower than the 100 kWh originally contemplated. But even at 100 kWh per month and 8 Rand cents per kWh, this yields only R96 per year, less than 1/5 of what is needed just to cover the capital costs.

The second of these problems is that during the apartheid era, many people refused to pay bills as a form of social protest. In many newly electrified areas, the problem of non-payment and illegal hook-ups became endemic. In some areas this has been resolved by pre-paid card meters, although this has been circumvented too. One successful conversion spent months prior to conversion on "customer training", developed local residents as sellers of the pre-paid cards and got strong endorsement from the local political council. The result of all this effort has been a substantial reduction in unpaid use of electricity.

ESKOM is involved also with the non-grid electrification of schools and clinics. The program is based on photovoltaic technology. Funding for this program comes from the South African Government, a grant from the Norwegian Government and funds from ESKOM. The program has recently been expanded to incorporate community liaison skills, project management capabilities and training of locally based black contractors. In addition to providing lighting for the schools, the program provides the schools with a TV set, video recorder and overhead projector.

ESKOM Labor Relations

ESKOM staff now totaling nearly 40,000 is down 10,000 from its peak ten years ago. Because of the felt need for self sufficiency discussed earlier, the staff is capable and encompasses a broad base of skills.

However, the staff is changing based on government policy and ESKOM management commitment to racial diversification. Starting in 1994, ESKOM committed itself "so that 50% of management, professional and supervisory staff will be Black South Africans by the year 2000." This very ambitious goal is being implemented through a buy-out program. If an employee in one of the qualifying positions can find a Black South African or other disadvantaged people to replace him or her, ESKOM will buy that person out with what appears to be an attractive proposal.

A number of talented people from ESKOM, seeing their future advancement limited, have left to enter other firms or start up their own business. But, as more and more of the ESKOM staff is displaced, fewer and fewer external opportunities will exist. The ESKOM management is working hard to keep up the morale of its employees who are still there.

The progress of this "employment equity program" is striking. Starting at near a zero base in 1993, they have reached a little under 10% by the end of 1994, 16% by 1995, 25% by 1996 (see Exhibit 26) and well over 30% by 1997.

Similar transition is being made in the entry jobs in the represented and other non-supervisory, non-professional ranks (physical skilled trades and clerical) but these data have not been made public. In addition to active recruiting, ESKOM has pursued aggressive training and development programs for its personnel at all levels of the organization.

OTHER OBSERVATIONS:

Department of Minerals and Energy

This Department, referred to as the Department of Energy or simply the Department in the rest of this text, is part of the Ministry of Minerals & Energy, Posts, Telecommunications & Broadcasting. This Ministry has a very broad mission under its present title. There is discussion in government circles about a potential reorganization. One possibility is splitting off the energy and minerals responsibilities of this Ministry into a separate ministry and moving the rest of the responsibilities to other existing ministries. Another possibility is placing some of this Ministry's responsibilities, including energy, into the Ministry of Trade & Industry. However, such changes do not appear imminent at the present time..

The Department's staff expressed interest in the potential for meeting their goals by the efforts of an organization such as IPI. One of the highest priorities of the Department is to extend electrification to the nearly half of the population yet unserved. In past years some funds were available from the central government to help achieve this goal but, given the current fiscal deficit, it is unlikely that significant government resources can be applied to such projects. Therefore, external sources such as ESKOM have been important in the last few years and will become increasingly important in the future as the initial allocation of such funds is exhausted. Of particular interest is the possibility of securing financing from sources external to the country.

Yet staff of the Department recognizes that present electrification programs have skimmed off only the easiest and most economically attractive projects. Even so, these projects are not showing a short term profit. This will make it more difficult to attract foreign capital.

One hope of the staff is that innovative technologies could be used to make the economics of non-grid connected electrification more attractive than it is now. Another hope of the staff is that consideration of overall "energization", that is the concept of integrated energy efficiency and utilization application, could make a conversion package cost effective.

This concept of "energization" has become quite popular among those working on providing service to presently unserved areas. One person believes that integrated infrastructure projects - including energy, water, communication, waste service and job opportunity - is the way to achieve the needed economics. He believes that many of these areas do derive enough disposable income from men working away from home in the diamond and minerals mines to support this type of development.

Another major objective of the Department of Energy is creating jobs for the unemployed and under-employed. Therefore, they advise that, in proposed projects, the technologies contemplated be labor intensive rather than capital intensive and that the technologies be simple enough to be built, operated and managed with indigenous labor. This may require intensive training of disadvantaged people. The Phambili Nambane project in Cape Town is cited as a project which was well designed to respond to this need. The project is a joint venture of ESKOM, EDF and Midlands Electric. The project team used local people for all but the top three positions in the venture and the team spent months in intensive training of not only their employees but prospective customers. Although the project is not turning a profit, it is one of the most successful of these electrification projects.

Another objective of the Department is that South Africans acquire and maintain long-term control of the infrastructure of their economy. There seems to be a concern among many people in South Africa, that opening up the economy to foreign investment could lead to foreign domination of South Africa's economic decisions and the siphoning off of resources from South Africa.

The Department staff made it clear that they would like to be kept advised of proposed projects. While their approval is not required under present laws or regulations, their concurrence and support would be immensely helpful in getting projects underway.

Value Added

The question frequently asked is what value can IPI add to a project as compared to a number of other players already in the field. It appears clear that unless IPI can add something special, existing commercial entities already involved in South Africa are more likely to be able to undertake additional projects.

IPI does have some special characteristics which may result in such value added. These are:

- 1. Credibility as an Honest Broker. As noted above, there is a suspicion by many in South Africa that foreign investment is likely to lead to a loss of control over their economy or to a disproportionate profit being extracted from the South African economy by foreign interests. IPI with its base in academia appears to be perceived as more likely to be "fair" to South African interests than projects led by other firms.*

ESKOM also recognizes that its neighbors are concerned about being dominated by South Africa. IPI, as a perceived honest broker, could help create a more trusting atmosphere in energy negotiations.

2. *Technology Contacts. For many of the perceived energy needs, brute force application of present technologies will not be economically successful. Either new technologies or innovative applications of existing technologies will have to be used. IPI's tie to two national laboratories and to developers of new technologies appears useful in developing such new ideas. IPI's tie to DOE is perceived as potentially helpful in obtaining demonstration funding for such technologies.*
3. *Environmental Credits. The opportunity for dramatic improvement in energy efficiency exists for many of the project possibilities identified in South Africa. No one in South Africa appears to have considered environmental credits as a tradable commodity or as a value added by such projects. IPI through The International Utility Efficiency Partnerships can add this consideration to projects.*
4. *Experience Base. Through its members, IPI can bring to bear on projects substantial experience in engineering, construction, operations, financing, management and technology knowledge. There are few potential partners to South African projects that can claim this kind of broad experience.*
5. *Relationship to South African Entities. IPI appears well placed to work with the South African Government agencies as well as with small and large South African companies. To attain financial viability, prospective projects may need the contribution of funds from government agencies in recognition of meeting some of their objectives. IPI projects are likely to be more acceptable recipients of such funding than purely commercial ventures. Similarly, finding South African partners for projects will be important to get broad acceptance for doing work in South Africa. IPI has the potential to be able to attract many such partners.*

EXHIBIT I
FIRMS OR AGENCIES AND PEOPLE CONTACTED

FIRM OR AGENCY	PERSONS CONTACTED	TITLE
American Chamber of Commerce (Joburg)	Luanne Grant Michael C. Hendry	Executive Director GE-SA & member of ACCSA
American Council on Education (Cape Town)	Fred M. Hayward	Senior Associate
Andersen Consulting SA (Joburg)	Mary Ann Geech* Peter Neuman Alex Daneer	Associate Staff ESKOM - wkg on AC project
Bechtel SA (Joburg)	Mike Cook*	LTA (loca; engineering firm wkg with Bechtel in SA)
Black& Veatch Africa Ltd. (Joburg)	Paddy Padmamathan*	CEO B&V SA was not available, no one else could speak for him
City of Cape Town - municipal distributor (Cape Town)	Berwyn (Fred) Taylor	Head of electricity Branch
Coca Cola SA (PTY) Ltd. (Joburg)	Jim Sepulveda	Staffing Mng. Human Resources
E. Metro Substructure (Joburg)	Justice Hlonuka-Ngidi	Mayor
EDF (Joburg)	Corinne Block*	Manager SA
ESKOM (Joburg)	John Arnesen Alex Daneel Michael Deats Johnny Dladla Anna Enrietti-Zoppo Piet Falling Thulani S. Gcabashe Don Gorender Chris Gross Adriaan Jooste Bongani Aug. Khumalo Paul Maclons Mopho Moerane Allen Moran K. S. Motosone	Marketing & Communication Materials Manager Sr. Gen. Mng. (Fuel & Tech.) Marketing & Communication International Cooperation Mng. Executive Dir. (Transmission) Sr. Gen. Mng. (Cust. Svc.) New Bus. Promotion Mng. Reserach Mng. (Power Generat.) Bus. Consulting Mng. Executive Dir. (Human Res.) Mng. Bus. Dev. & Info.Tech. Asst. Revenue Officer CEO Sales & Cust. Svc.
Fieldstone SA (PTY) Ltd. (Joburg)	Kevin Haggard	Associate
Finance South Africa Consulting (Joburg)	Trevor Tutu	CEO
Georgia Rep. (Cape Town)	Donald Keene	State Rep & Ind.consultant

EXHIBIT I
FIRMS OR AGENCIES AND PEOPLE CONTACTED

FIRM OR AGENCY	PERSONS CONTACTED	TITLE
Gibb Africa (Joburg) (Affiliate of Law Eng.) (Cape Town)	Richard Gordon José Saramago Trevor Gaunt*	Director Associate Associate & Prof. Power Systems at Cape Town U.
Investor Resource Center (CTwn) (Jt. Venture ESKOM/WESGRO)	Steve Flandorp Christopher J. Hazard Hermann F. W. Oelsner Karin L. Pickard	Director IRC - ESKOM Strategic Mktg. Mng. ESKOM Oelsner Group Deputy Director WESGRO
J. P. Morgan (Joburg)	Ronald Gault	Managing Director
Kaye, Scholer, Fierman, Hays & Handler (Joburg)	Wallace Ford II	Partner
Peninsula Tecknicon (Cape Twn)	Bryan Fugargi	Rector
Phoenix Venture Partners SA (PTY) Ltd. (Joburg)	Rick Johnson	Project Director
Phambili Nambane (PTY) Ltd. (Jt. Venture ESKOM/EDF/ Midlands Electric) Twnshp KHYALETSA (C Twn.)	Mac Mdingi EDF Representative	General Mng. - ESKOM Engineering Mng. - EDF
SBT Juul Africa (Joburg)	Trevor Carelse Juul	C E Director
Technology Consultant (Joburg)	Isaac O Coker	Consultant (x-ESKOM)
SA Dept. of Minerals & Energy (Pretoria)	Joe Asamoah Nomakosana Kosi Lisa	Chief Energy Specialist Director, Energy for Dvlpmnt.
US Dept. of Commerce (Joburg) (Cape Town)	Millard W. Arnold Nazeer Sterras	Minister Counselor Commercial Specialist
US AID (Pretoria)	Joel E. Kolker Henry W. Reynolds Paul E. Weisenfeld Aaron Williams	Housing & Urban Dvlp. Deputy Director Regional Legal Advisor Director
US Embassy (Pretoria)	Lee Vrudwick*	Commercial Officer
US Peace Corps (Pretoria)	Earl W. Yates	Country Director
U of the Western Cape (C Twn)	Cecil Abrams* Alwyn J. Van Gensen	Rector Exec Asst. to Rector & Vice Chancellor

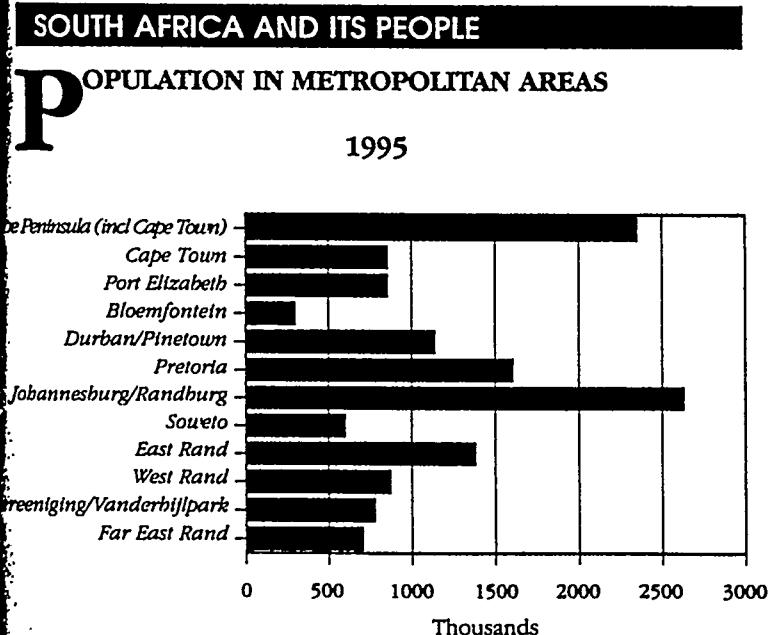
* contacted by phone

EXHIBIT 2



 MAP OF SOUTH AFRICA

EXHIBIT 3



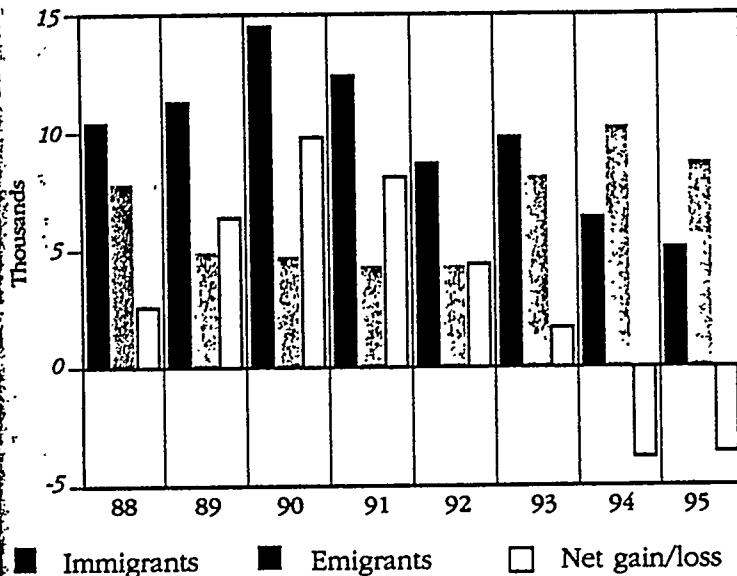
Source: Central Statistical Services

These are official statistics. They do not, and cannot, take into account the vast population shifts from rural to formal settlements in urban areas and illegal migration into South Africa. The results of the 1996 census were not available for publication.

EXHIBIT 4

MIGRATION

1988 - 1995



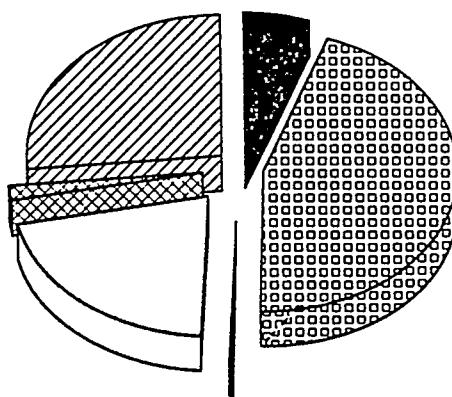
Source: *Development Bank of Southern Africa*

EXHIBIT 5

SOUTH AFRICA AND ITS PEOPLE

ORIGIN OF IMMIGRANTS – 1995

Total immigrants: 5,064



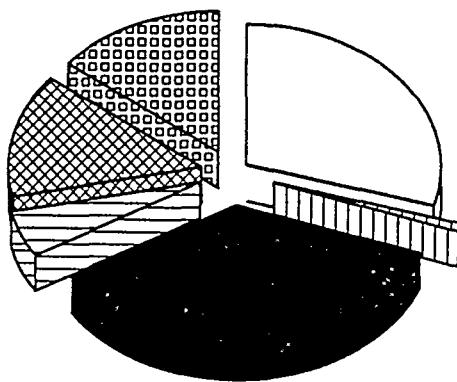
- Americas (5.5%)
- ▨ Europe (44.9%)
- Unspecified (0.4%)
- Asia (21.0%)
- ▨ Oceania (1.7%)
- ▨ Africa (26.5%)

Source: *Central Statistical Services*

EXHIBIT 6

DESTINATION OF EMIGRANTS – 1995

Total emigrants: 8,725



- Oceania (28.0%)
- Unspecified (0.9%)
- Europe (34.0%)
- Asia (5.1%)
- Africa (13.5%)
- Americas (13.5%)

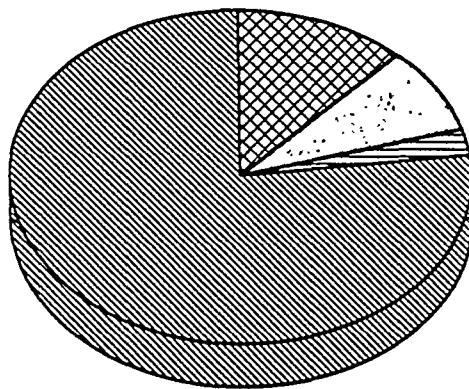
Source: *Central Statistical Services*

EXHIBIT 7

SOUTH AFRICA AND ITS PEOPLE

POPULATION BY RACE – 1996

Total population: 44.6m

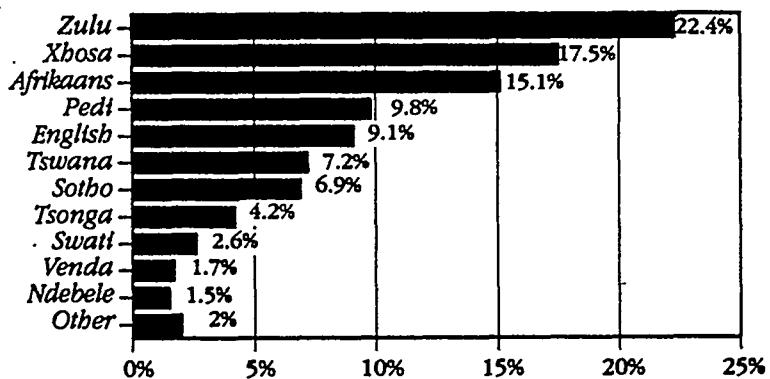


- Whites 5.4m (12%)
- Coloured 3.8m (8.5%)
- Asians 1.2m (2.5%)
- Africans 34.3m (77%)

Source: *Development Bank of Southern Africa*

EXHIBIT 8

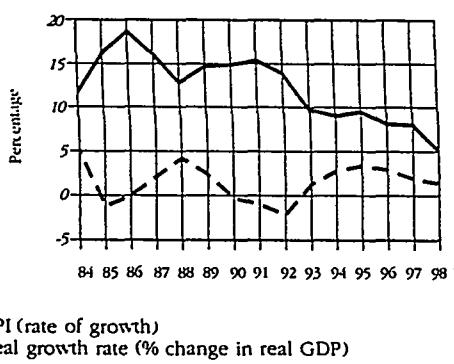
POPULATION BY HOME LANGUAGE 1995



Source: Central Statistical Services

EXHIBIT 9

CPI AND REAL GROWTH RATE 1984 – 1998

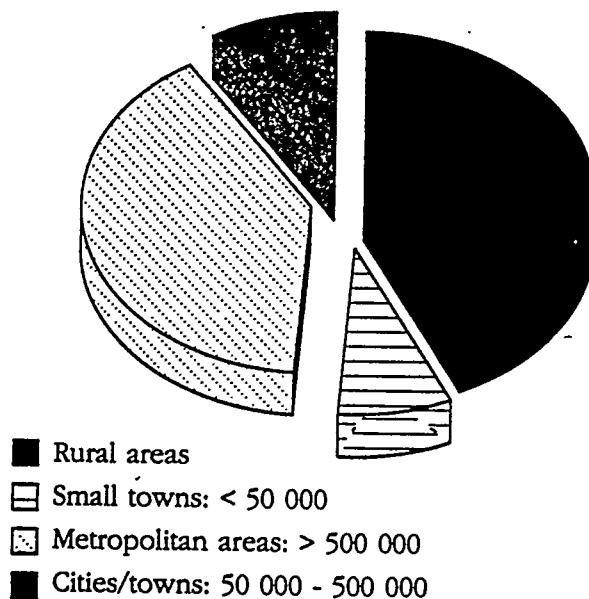


— CPI (rate of growth)
- - - Real growth rate (% change in real GDP)

Source: Pretoria University, Economics Department, 1997

EXHIBIT 10

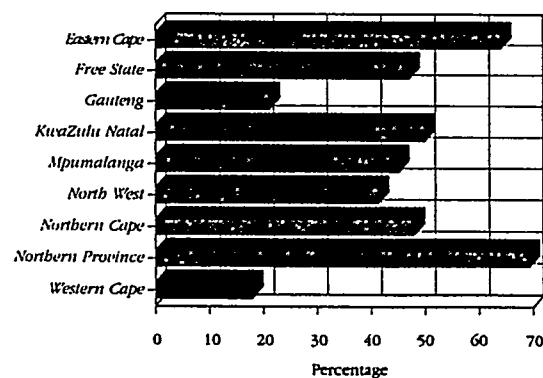
POPULATION DISTRIBUTION 1995 URBAN-RURAL SPLIT



Source: *Centre for Development and Enterprise*

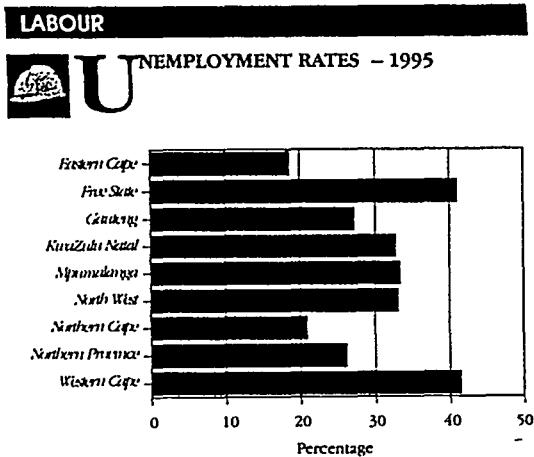
EXHIBIT 11

POVERTY HEAD COUNT PER PROVINCE % individuals living in poverty



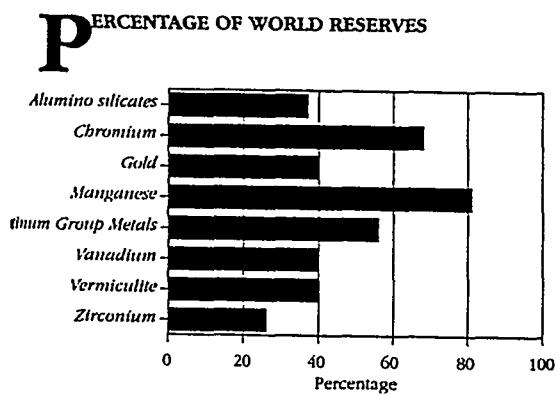
Source: *Human Sciences Research Council 1995*

EXHIBIT 12



Source: October Household Survey, CSS

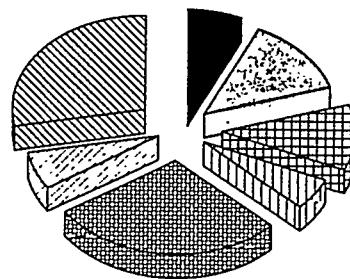
EXHIBIT 13



Source: Minerals Bureau

EXHIBIT 14

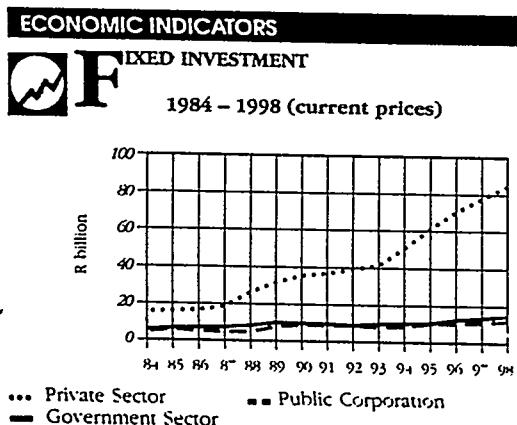
FORMAL EMPLOYMENT BY SECTOR – 1995 (excluding agriculture)



- Construction (6.7%)
- Trade (13.4%)
- 田 Mining (11.2%)
- Public Corps (5.6%)
- General Government (28.6%)
- Private Services (6.4%)
- Manufacturing (28.1%)

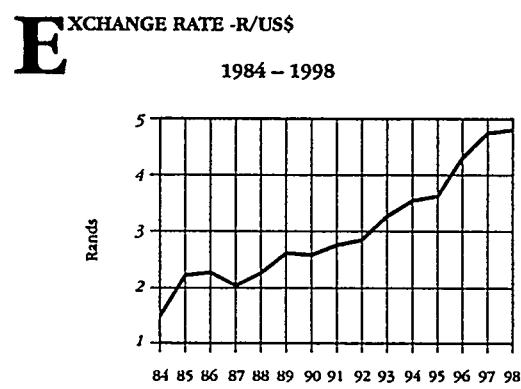
Source: SA Reserve Bank

EXHIBIT 15



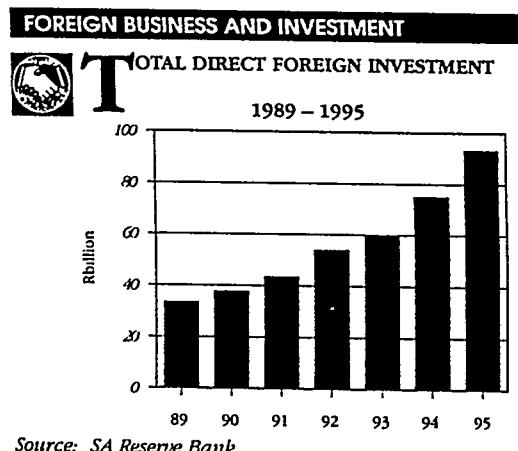
Source: Pretoria University, Economics Department, 1997

EXHIBIT 16



Source: *Pretoria University, Economics Department, 1997*

EXHIBIT 17



Source: *SA Reserve Bank*

EXHIBIT 18

MAJOR ELECTRICITY UTILITIES IN THE WORLD

Utility	Country	Sales GWh	Rating by sales	Nominal capacity MW	Rating by capacity
EDF	France	341 900	1	97 800	1
TEPCO ¹	Japan	254 351	2	51 207	3
ENEL ²	Italy	205 132	3	52 463	2
Hydro-Québec	Canada	166 101	4	31 162	7
Eskom ³	South Africa	165 370	5	38 497	4
Korea Electric Power Co	South Korea	163 270	6	32 184	6
Ontario Hydro	Canada	140 850	7	29 244	8
TVA ⁴	USA	134 155	8	25 831	11
Kansai Electric Power Co ¹	Japan	133 816	9	36 371	5
RWE ⁵	Germany	125 582	10	26 061	10
Chubu Electric Power Co ¹	Japan	112 606	11	27 508	9
Tai Power	Taiwan	105 368	12	12 898	14
Commonwealth Edison	USA	91 353	13	25 010	12
National Power ¹	United Kingdom	90 800	14	19 635	15
Texas Utilities Electric	USA	90 103	15	22 305	13

*All data for the year ended 31 December 1995, except for the year ending as follows:
 1 31 March 1996 2 31 December 1994 3 31 December 1996 4 30 September 1995 5 30 June 1995
 Source: Tepco illustrated (Tokyo Electric Power Company)*

Source: ESKOM Annual Report, 1996

EXHIBIT 19

5. SALES OF ELECTRICITY TO CATEGORIES OF CUSTOMERS

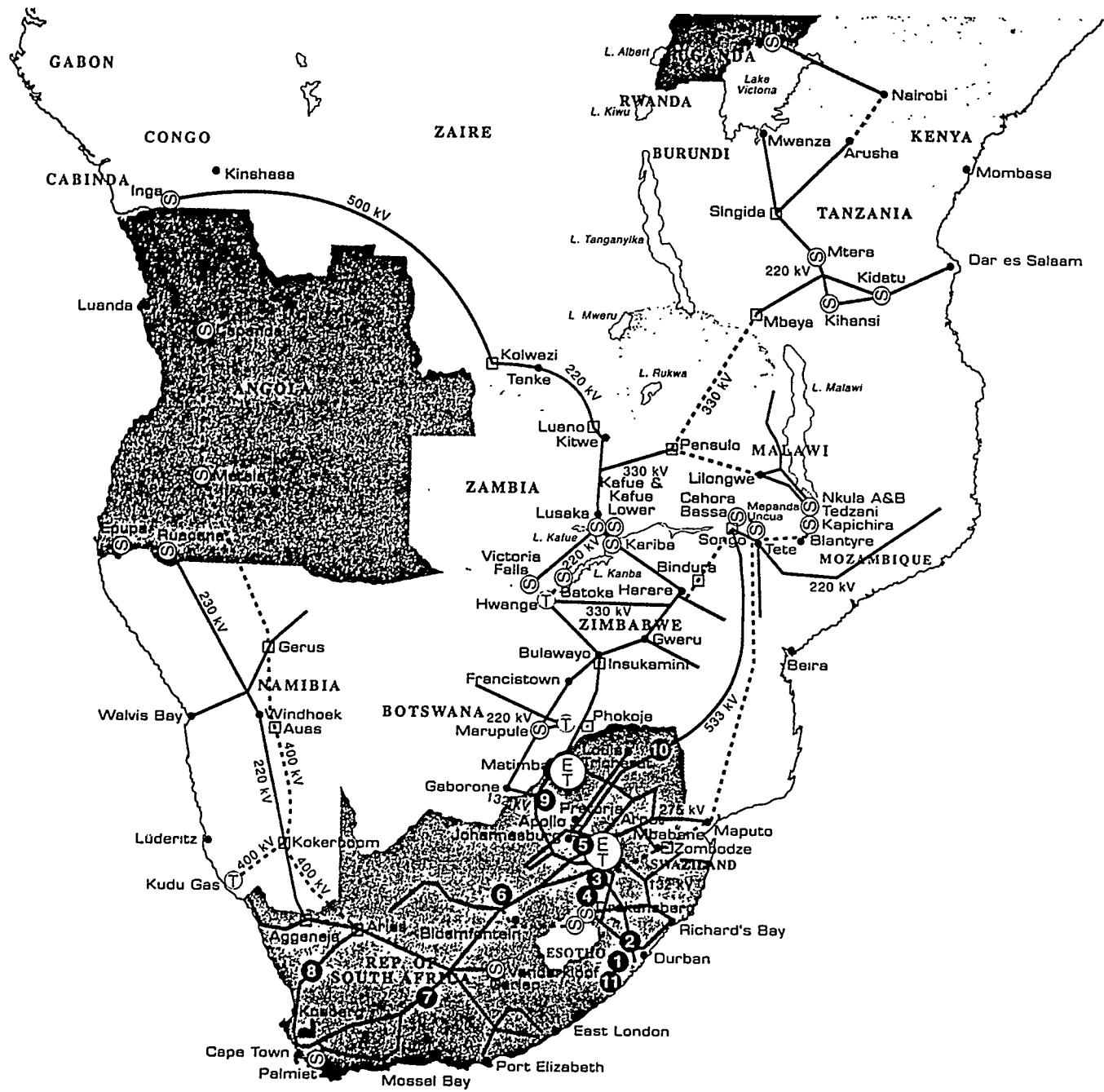
Category	Number of customers		Change 95 - 96 %	GWh sold		Change 95 - 96 %
	1996	1995		1996	1995	
Redistributors	752	704	6,8	69 905	66 421	5,2
Domestic and street lighting ¹	1 712 958	1 407 117	21,7	4 753	3 906	21,7
Commercial	23 869	23 098	3,3	654	579	13,0
Industrial	7 199	6 326	13,8	47 451	42 244	12,3
Mining	731	661	10,6	31 188	31 293	(0,3)
Rural	131 541	129 590	1,5	3 239	3 383	(4,3)
Traction	155	38	307,9	3 458	3 522	(1,8)
International ²	4	4	0,0	4 441	1 832	142,4
Own usage	60	255	(76,5)	281	367	(23,4)
	1 877 269	1 567 793	19,7	165 370	153 547	7,7³

1. Includes pre-paid sales. 2. International category comprises four main customers in Botswana, Mozambique, Namibia and Zimbabwe. 3. The growth from 1995 to 1996 is 7,8% if own usage is excluded.

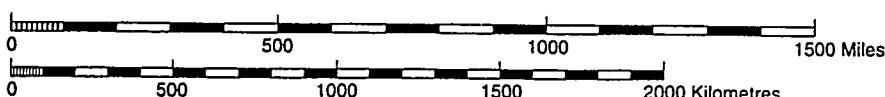
Source: ESKOM Annual Report, 1996

EXHIBIT 20

SOUTHERN AFRICAN GRID



- Existing grid system
- - - - - Possible future grid system
- (H) Hydroelectric power station
- (E T) Eskom thermal stations
- (T) Thermal power station
- (N) Nuclear power station
- (□) Interconnection substation



Source: ESKOM Annual Report, 1996

EXHIBIT 21

4. TRANSMISSION AND DISTRIBUTION EQUIPMENT IN SERVICE AT 31 DECEMBER

		1996	1995	Change
Main transmission system, km	765 kV	1 153 ¹	1 153 ¹	0
	533 kV DC (monopolar)	1 035	1 031	4
	400 kV	14 216	13 981	235
	275 kV	7 130	7 148	(18)
	220 kV	1 239	1 243	(4)
	132 kV	653	632	21
Total transmission lines², km		25 426	25 188	238
Distribution lines, km	165-132 kV	18 730	16 632	2 098
	88-33 kV	20 597	20 230	367
Total distribution lines, km		39 327	36 862	2 465
Reticulation lines, km	22 kV and lower	190 992	179 752	11 240
Total all lines, km		255 745	241 802	13 943
Cables, km	165-132 kV	47	47	0
	88-33 kV	243	206	37
	22 kV and lower	5 767	4 838	929
Total all cables, km		6 057	5 091	966
Transformers	Transmission, MVA ³	124 790	124 790	0
	Distribution and reticulation, MVA	71 382	68 681	2 701
Total transformer capacity, MVA		196 172	193 471	2 701
Transformers	Transmission, number	455	453	2
	Distribution and reticulation, number	224 724	213 099	11 625
Total transformers, number		225 179	213 552	11 625

1. 282 km of 765 kV line presently operating at 400 kV. 2. Transmission line lengths as per GIS (Geographic Information System) distances.
 3. Base of definition: transformers rated \geq 30 MVA and primary voltage \geq 132 kV.

Source: ESKOM Annual Report, 1996

EXHIBIT 22

1. POWER STATIONS IN COMMISSION AT 31 DECEMBER 1996

Name of station	Location	Number and capacity of generator sets	Total nominal capacity MW	Total net maximum capacity MW ¹	Generators in reserve storage	
					Number	Total rating MW
Coal-fired stations						
Arnot ²	Middelburg, Mpumalanga	6 x 350	2 100	1 980	3	990
Camden ³	Ermelo	8 x 200	1 600	1 520	8	1 520
Duvha ²	Witbank	6 x 600	3 600	3 450	—	—
Grootvlei ³	Balfour	6 x 200	1 200	1 130	6	1 130
Hendrina ²	Hendrina	10 x 200	2 000	1 900	—	—
Kendal ^{2,4}	Witbank	6 x 686	4 116	3 840	—	—
Komati ³	Middelburg, Mpumalanga	5 x 100; 4 x 125	1 000	891	9	891
Kriel ²	Bethal	6 x 500	3 000	2 850	—	—
Lethabo ²	Sasolburg	6 x 618	3 708	3 558	—	—
Majuba ⁵	Volksrust	1 x 657	657	612	—	—
Matimba ^{2,4}	Ellisras	6 x 665	3 990	3 690	—	—
Matla ²	Bethal	6 x 600	3 600	3 450	—	—
Tutuka ²	Standerton	6 x 609	3 654	3 510	—	—
Subtotal coal-fired stations (13)			34 225	32 381	26	4 531
Gas turbine stations⁶						
Acacia	Cape Town	3 x 57	171	171	—	—
Port Rex	East London	3 x 57	171	171	—	—
Subtotal gas turbine stations (2)			342	342	—	—
Hydroelectric stations⁷						
Colley Wobbles ⁸	Mbashe River	3 x 14	42	42	—	—
First Falls ⁸	Umtata River	2 x 3	6	6	—	—
Gariep	Norvalspont	4 x 90	360	360	—	—
Ncora ⁸	Ncora River	2 x 0,4; 1 x 1,3	2	2	—	—
Second Falls ⁸	Umtata River	2 x 5,5	11	11	—	—
Vanderkloof	Petrusville	2 x 120	240	240	—	—
Subtotal hydroelectric stations (2)			600	600	—	—
Pumped storage schemes⁹						
Drakensberg	Bergville	4 x 250	1 000	1 000	—	—
Palmet	Grabouw	2 x 200	400	400	—	—
Subtotal pumped storage schemes (2)			1 400	1 400	—	—
Nuclear power station						
Koeberg ²	Cape Town	2 x 965	1 930	1 840	—	—
Total Eskom stations in commission (20)			38 497	36 563	26	4 531

1. Difference between nominal and net maximum capacity reflects auxiliary power consumption and reduced capacity caused by age of plant and/or low coal quality. 2. Base-load station. 3. In long-term reserve storage (motibalised). 4. Dry-cooled unit specifications are based on design back-pressure and ambient air temperature. 5. Unit 2 expected to be commissioned in April 1997. 6. Stations used for peaking or emergency supplies. 7. Use restricted to peaking, emergencies and availability of water in Gariep and Vanderkloof dams. 8. Not an Eskom asset, but during 1995 Eskom was licenced to generate electricity at this station. Generating capacity is not included in Eskom total generating capacity. 9. Pumped storage facilities are net users of electricity. Water is pumped during off-peak periods to generate electricity during peak periods.

EXHIBIT 23

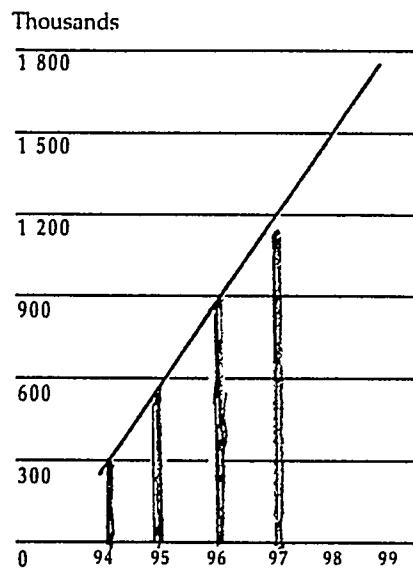
6. REVENUE PER CATEGORY OF CUSTOMER

Category	Revenue Rm		Change 95 - 96 %	Average price c/kWh sold		Change 95 - 96 %
	1996	1995		1996	1995	
Redistributors	7 785	7 155	8,8	11,14	10,77	3,4
Domestic and street lighting ¹	924	709	30,3	19,45	18,15	7,2
Commercial	127	108	17,6	19,49	18,65	4,5
Industrial	4 794	4 394	9,1	10,1	10,40	(2,9)
Mining	3 437	3 322	3,5	11,02	10,62	3,8
Rural	757	744	1,7	23,39	21,99	6,3
Traction	530	516	2,7	15,31	14,65	4,5
International ²	302	127	137,8	6,8	6,93	(2,0)
Own usage	31	39	(20,5)	10,91	10,63	2,7
	18 687	17 114	9,2	11,30	11,15	1,4 ³

1. Includes pre-paid sales. 2. International category comprises four main customers in Botswana, Mozambique, Namibia and Zimbabwe. 3. Official price increase 4%; actual 1,4%, due to a change in the mix of sales, lower revenue from commodity-linked tariffs and the phasing out of capacity allocations to certain municipalities.

Source: ESKOM Annual Report, 1996

electrification connections

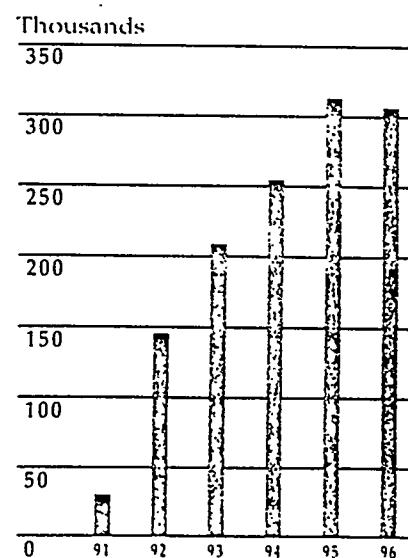


Cumulative connections
— Cumulative target

EXHIBIT 25

Eskom electrification connections

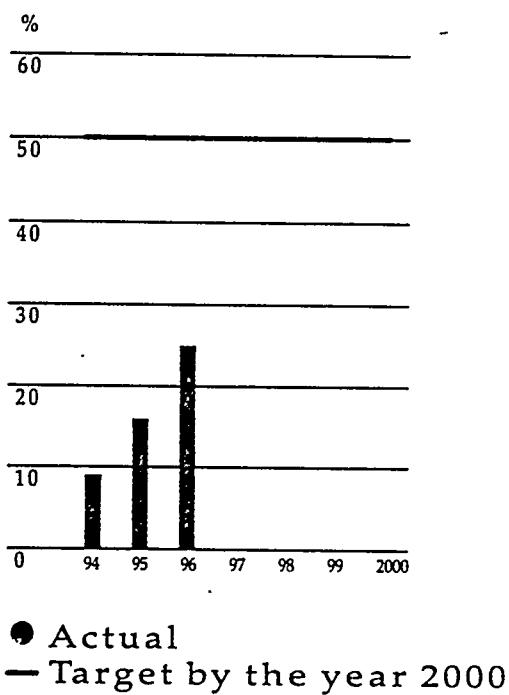
Source: ESKOM Annual Report, 1996



Source: ESKOM Annual Report, 1996

EXHIBIT 26

Implementing employment equity



Source: ESKOM Annual Report, 1996

D

REPORT ON THE INTERNATIONAL POWER INSTITUTE'S

SECOND VISIT

TO

SOUTH AFRICA

PREPARED BY

**JULIUS E. COLES
JAMES H. PORTER
AND
RENE H. MALES**

**INTERNATIONAL POWER INSTITUTE
MOREHOUSE COLLEGE
JUNE 1999**

IPI SECOND VISIT TO SOUTH AFRICA

SUMMARY

The second International Power Institute trip to South Africa was made for the following several reasons:

1. To renew acquaintances and identify electrification opportunities because of the on-going organizational restructuring at ESKOM and the pending election of a new government in the Republic of South Africa;
2. To co-host the "Electrifying Africa '99" conference with ESKOM and the Pennwell Corporation;
3. To develop cooperation and interaction between faculty and students at Morehouse and universities and technikons in the Republic of South Africa so as to establish a support network for electrification projects; and
4. To seek further opportunities to promote electrification projects in South Africa.

We found on this trip that many of the contacts we initially made were no longer in place, primarily because of the on-going restructuring in ESKOM. However, great strides are being made in opening education and job opportunities to everyone. Economic activity must increase in the Republic of South Africa to provide employment and reduce crime.

We visited a number of townships and villages not yet served with electricity. Some even had distribution circuits and service drops installed but no electrons were flowing. Our initial impression is that economic development is essential for the successful development of power infrastructure projects. ESKOM agrees with this observation but middle management is so overwhelmed with the issues before them that they seem unable to act and unwilling to accept outside assistance.

In general, we carried out the objectives of our mission although we were disappointed that our in-roads at ESKOM had not produced the results expected.

PURPOSE OF THE TRIP

This second trip to South Africa, which took place between February 25th and March 12th, 1999, was initiated to accomplish several objectives. These were:

1. Determining the status of the Labor Training Proposal delivered to ESKOM in July 1998;
2. Seeking other opportunities for services IPI could provide ESKOM;
3. Identifying further opportunities for IPI in South Africa;
4. Hosting the "Electrifying Africa '99" conference jointly sponsored by Pennwell, ESKOM, and Morehouse IPI;
5. Visiting with universities and technikons to identify opportunities for student and faculty exchange and participation in energy related projects.

The Morehouse contingent on this trip were:

- a. Julius E. Coles, who led the first trip to South Africa;
- b. James H. Porter, the new Director of IPI;
- c. John H. Stanfield, Chair of the Department of Sociology;
- d. Donald Vest, Professor of Economics on Sabbatical in Zimbabwe; and
- e. Rene H. Males, Vice Chairman, IPI Advisory Board, who accompanied Mr. Coles on last year's trip.

In addition to this group, were members of IPI's Advisory Board who were giving papers at the "Electrifying Africa '99" conference. They were:

- a. Siisi Adu-Gyamfi, Vice President Marketing, Cummins Engine
- b. Richard Ector, President, Tennessee Valley Infrastructure Group
- c. Sharieff Mustakeem, President, MCX Energy and Environmental

ELECTRIFYING AFRICA '99 CONFERENCE

IPI co-hosted with ESKOM and the Pennwell Corporation of Tulsa, Oklahoma, the first conference on African power generation entitled "Electrifying Africa '99". The meeting was held in Sun City, Republic of South Africa. Approximately one hundred delegates attended this first of a kind conference in sub-Saharan Africa. Mr. Julius Coles moderated the keynote session, and at the invitation of IPI, former Secretary of Energy, Hazel O'Leary gave the keynote address. In addition, Dr. James Porter chaired the session entitled "Distributed Power Generation and Infrastructure Systems for Remote Locations," and Dr. Donald Vest gave a presentation on doing business in Africa. Three other presentations were made at the conference by IPI Advisory Board members - TVIG, Cummins Engine and the MCX Energy and Environmental Corporation. As a consequence of this first conference, Mr. Coles and Dr. Porter

of IPI, Mr. Adu-Gyamfi of Cummins Energy, Mr. Ector of TVIG and Mr. Mustakeem of MCX Energy and Environmental Corporation have all joined the planning group with the Pennwell Corporation for "Electrifying Africa '2000."

ESKOM could have provided greater support for the conference, improving its attendance.

VISIT TO THE MINISTRY OF MINERALS AND ENERGY

Following the Sun City conference, the IPI contingent visited Mr. David K. Mahuma, Deputy Director Electricity at the Ministry of Minerals and Energy in Pretoria. We had met Mr. Mahuma at the Sun City Conference. He brought in Mr. André Otto whose primary concern in the Ministry was the electrification of off-grid communities. We explained our concept for powering off-grid communities to Messrs. Mahuma and Otto. We stated that households in these communities could not afford power and to make power affordable; it had to be used to increase community income. The concept appealed to them and they put us in touch with a couple named Burger who are involved with projects to enhance community income.

While in Pretoria, we stopped by the U.S.A.I.D mission and met with Russell Hawkins to determine if there were any energy related opportunities through U.S.A.I.D. He stated that their mission in South Africa and budget had been addressed. He mentioned the RAISE IQC's which were available at headquarters to fund rural agricultural infrastructure development projects, but other than that opportunities through U.S.A.I.D. were limited.

MEETING WITH CURMO DESIGN, INCORPORATED

Following the advice of David Mahuma, we arranged an appointment and met with Dr. W. P. Burger and his wife, Dr. M. M. Van Zyl Burger. The Burgers are the principals of Curmo Design, Inc., and are educators and social scientists who have been involved in community development work for most of their careers. They have focused their activities on South African communities, with sub-standard living conditions, and building business enterprises within these communities. We explained our concept of using infrastructure to enhance community income. They were intrigued with the concept. We left, hoping to be able to work together on future projects.

MEETING WITH ESKOM

Dr. Vest left our team and returned to Zimbabwe. Mr. Ector of TVIG joined us as we met with Mr. Rodney Buttle and Mr. John Gosling. We first met with Mr. Gosling, following-up on the labor proposal we had submitted to ESKOM in the summer of 1998. Mr. Gosling explained about the re-organization that ESKOM was undergoing and that the proposal was now in the hands of Mr. R.S. (Sully) Moloko, the senior general manager at ESKOM. At a later meeting with Mr. Moloko we alerted him to the fact that the proposal was in his department. He tracked it down and after a brief reading stated that no decision would be made until after the re-organization at ESKOM was complete. The completion of re-organization was expected some time in the summer or early fall of 1999.

In the second part of the meeting with Mr. Buttle we describe our concept of using electric power, water and other infrastructure to enhance community income to the extent that the infrastructure was affordable in the community. Mr. Buttle was interested in the concept. We asked Mr. Buttle if he could identify any communities where this strategy would work. He declined to identify such communities until and if we had a contract with ESKOM in place.

VISITING OFF-GRID COMMUNITIES

While in Sun City and Johannesburg we took several field trips to visit off-grid communities. These communities were not yet serviced with electric power although transmission lines ran directly overhead these villages and one village was hooked up to the grid but no power was turned on. These communities appeared to have limited resources, some land, and water availability varied from ground water resources in arid regions to adequate rainfall in villages near the major cities.

Forty-seven percent of South Africans still do not have electric service. ESKOM has committed to providing service to at least 300,000 of these households per year. They have accomplished this goal in the last four years and hope to reduce the unserved population to 30 percent early in this next decade. However, as we saw in this year's visit and in last year's visit, even with very innovative approaches to reduce costs, these new services are not economically viable. The primary problem is that the capital cost of service is so large in comparison with the minimum use made of the service, that the revenue will not cover the capital costs let alone the operating costs. It is apparent to us that without some form of help to use this new resource to increase the cash income in the community, there is no chance of economic success. Yet, in the cases we visited, we believe that there is opportunity to use the existing natural resources of each area to make such electrification projects self-sustaining. But, such developments take imagineering. We believe that an integrated development plan focusing on electricity, water and other infrastructure service along with a plan to utilize these facilities to produce an exportable product or service is needed to create viable projects. A very critical assessment of these communities will be required to identify those with a significant potential to successfully benefit from an income enhancement through infrastructure project.

VISIT TO UNIVERSITIES AND TECHNIKONS

The balance of our trip was spent visiting universities and technikons to develop inter-university relationships between faculty and students at Morehouse and faculty and students in the Republic of South Africa. In particular, we were seeking ways to develop personnel in both countries, which could support future endeavors in which the Morehouse IPI might engage.

In the Capetown area our group split up. Dr. Stanfield visited the University of Capetown (UCT) while Mr. Coles, Dr. Porter and Mr. Males visited the Western Cape

University (WCU), and the Peninsula Technikon (PT). Dr. Stanfield met with the UCT Energy Institute in the Department of Electrical Engineering. This institute is well funded and may serve to provide support services in research on infrastructure development. He also met with the Dean of Humanities, Wilmont James and Dr. Annette Steegers of the Political Science Department. These persons will serve as useful contacts for assessing communities for infrastructure projects.

At the Western Cape University, we met with Ms. Patricia Smit who headed the Tertiary Education Linkages Project funded by the UNCF. They are still drafting a detailed plan to form linkages between the Republic of South Africa students and students in other countries for the purposes of cultural exchange. The concept of using infrastructure to enhance community income was intriguing to her and she would be interested in collaborating on a student exchange basis using this concept as a theme for collaboration.

At the Peninsula Technikon we met with the vice-chancellor, Mr. Brian Del Figaji and the Administrative Officer, Mrs. Meryl Hodges. The PT is similar to our two-year junior colleges providing an education in practical areas, such as business administration and nursing. We happened to arrive on the day of their graduation program and were invited to attend the ceremonies. We did and observed the great enthusiasm among faculty, students, and parents. Education is high on the list of personnel goals and is supported throughout the South African social structure. PT received funding in the first round of the UNCF program and is currently evaluating U.S. participants in the program. Clark Atlanta University and North Carolina A & T are in the running as cooperative institutions with PT. There is a potential for future cooperation between PT and Morehouse.

We next traveled to Durban, South Africa where we met with personnel from the ML Sultan Technikon and the University of Durban, Westville. At the ML Sultan Technikon we met with:

- Professor Anshir PaDayachee - Deputy Vice Chancellor Academic Affairs
- Afand Cheddie - Deputy Vice Chancellor Administration
- Professor Ramesh Bharuthram - Director of Research and
- Mr. Ujen S. Purmasir - Deputy Vice Chancellor Resources, Planning and Communications

ML Sultan is a Technikon that primarily served an Indian population in the past but in recent years has seen dramatic growth of the black student population. They are strong in training in the sciences and industrial arts. They too were interested in our concept of using infrastructure for community income enhancement and would like to join us in participating in projects we may develop.

The University of Durban Westville is one of the leading universities in South Africa with a predominantly Indian student body but with an increasing enrollment of black students. We met with the engineering departments where they have a strong faculty and courses in the primary engineering disciplines. We met with:

- Kiru Naidoo - Director of Public Affairs
- Prem Ramlachan - Assistant Director Graduate and International Studies
- Professor L.M. Masu - Dean Faculty of Engineering

They are one of only eight schools of engineering in South Africa and want to insure that in any cooperative effort they may join, there are mutual benefits for both parties and issues of funding are resolved.

We mentioned several possibilities for collaboration. They were most interested in the infrastructure for economic enhancement project. There are two Morehouse students at the University and it would be advantageous to encourage further student exchange.

While in South Africa we met with several other American visitors there. They included

- Mr. Don Keene - Georgia State Representative to the Republic of South African. He is a business development specialist.
- Mr. Ronald D. Brown - Attorney, LeBoeuf, Lamb, Greene & MacRae, promoting Seminars on Deregulation in the Utility Industry.
- Mr. John Butler - Executive Director, African Electrification Foundation. John is promoting electrification in Africa and is also funded by D.O.E.



Raising Rural Incomes Through Distributed Power, Water, and Telecommunications

*Draft Task Order
Opportunities Under the
RAISE IQC*

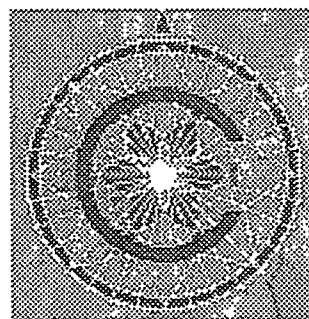
**Unsolicited proposal by
TVIG/TVA/Chemonics**

For consideration by

USAID Central America Missions

June 15, 1999

TVIG



Proposed Task Order

Table of Contents

I. Background

- Strategic Objectives Addressed
- What is Distributed, Integrated Infrastructure?
- The Benefits of Distributed, Integrated Infrastructure
- How Does DII Achieve RAISE's Core Objectives?
- Facilitating Community Economic Development
- Leveraging Domestic Private Sector Resources for Community-based Development
- Benefits Beyond the Community
- Proposed Pilot Distributed Infrastructure Projects Under RAISE

II. Tasks to be Performed Under This Task Order

A. Phase I

1. Workplan
2. Developing Community Selection Criteria and Community Assessment Protocols
3. National Template: Legal, Investment, Financial, Environmental
4. Apply Criteria to Site Selection Process
Decision Point One
5. On-Site Surveys
6. Phase I Final Review and Report
Decision Point Two

B. Phase II* (Optional-see notes)

1. Training
2. Site Development

C. Phase III

1. Community Business Development
2. Post installation Monitoring and Evaluation

III. Key Personnel

IV. Corporate Profiles: Chemonics, TVA and TVIG

V. Management: Roles and Responsibilities

VI. Level of Effort and Description of Functions

VII. Deliverables

Proposed Task Order**Strategic Objectives Addressed**

Honduras IR 1: Economic Activity Reactivated. Distributed, Integrated Infrastructure (DII) will provide short-term economic benefit through job creation. Long-term economic reactivation will occur as a result of opportunities created by electrification and secondary economic activities stimulated by infrastructure availability such as value-added to agriculture products and manufacturing.

Nicaragua IR 2: Economic livelihood of farmers, microentrepreneurs and laborers restored in Mitch-affected areas. Specifically, the DII approach to infrastructure development will benefit producers in the areas of Wiwilí, San Marcos de Jinotega and Estelí, through enhanced telecommunications and electrical services for irrigation, agricultural commodities processing and value-added activities.

El Salvador SO1: To expand access and economic opportunity for El Salvador's rural families in poverty. Specifically, DII will address the needs of rural populations under IR3 rural productive services, and IR5 infrastructure, by developing structures by which private sector capital can be leveraged in a sustainable manner to provide much needed electrical services for irrigation, agricultural processing and value added activities, as well as purified water for micro-industrial processing and general community consumption.

Guatemala SO2: Poverty reduced in selective geographic areas. Specifically, DII will contribute to expanded economic opportunity for rural poor through increased incomes and improved access to education through distance learning opportunities. Rural poor will increase on and off-farm incomes as a result of improved communication for the coordination of key inputs, access to improved technical capabilities including the use of irrigation and the development of value-added capabilities in the area of agricultural storage and processing, made possible by the availability of electricity and clean water.

Task Order for Distributed, Integrated Infrastructure

This task order will enable up to five communities and multiple investors to procure integrated utilities systems providing electricity, and clean water and telephone service. It will also support community level business development plans to accelerate economic growth. It will leverage private capital from local investors to effect the plans and improve the quality of life of local residents at selected Demonstration Project Sites. These sites will be used to attract additional sites and investors to replicate the process on an even wider scale. The Demonstration Projects proposed here address RAISE's core strategic objective of raising rural incomes. For areas devastated by Hurricane Mitch, they will provide visible means for reconstruction with lasting benefits.

What is Distributed, Integrated Infrastructure?

In the past, infrastructure development in emerging economies has often been defined by single-purpose mega-projects located in or near major population centers. They were typically government owned monopolies. Power, water and telephone service were separately administered and operated.

Distributed power is a cutting-edge concept in infrastructure development that is driving the current trend away from larger centralized power stations toward systems that generate power locally. Distributed power is ideal for bridging the gaps in electricity supply and demand, as the provision of additional power is quick and easily financed. In addition, distributed power is more stable and cost-effective than large centralized power stations. It relies on several power sources and consequently, in the event of an outage, power can be routed to minimize disruptions in the power supply. Moreover, it does not require large investments in transmission and distribution equipment when power has to be transmitted to remote areas.

Distributed development is exactly what the Tennessee Valley Authority did in the United States in the 1930's, '40's and '50's. In 1933 the Tennessee Valley had 40% of the depression era national income and was plagued by conditions of severe flooding and agricultural depletion. TVA has successfully built the Valley into one of the healthiest economies in the U.S., and is now the world-recognized case study in integrated resource development. TVA's focus then was on distributed development of medium-sized communities. This proposal uses the same strategy, updated with newer technology and focused on private-sector ownership and financing.

Integrated infrastructure is a significant advance in the concept of distributed power. In addition to electricity in rural areas, it provides water treatment, telecommunications, health and education components and community business development plans in one package, immediately improving human conditions within recipient communities. By initiating all of the basic utilities and services that a community needs simultaneously, integrated infrastructure projects serve as a foundation for programs to jump start economic growth in small and medium-sized communities.

The units can be profitably operated by local investors and provide services to rural agricultural and tourism projects, and villages and towns in isolated areas. They are designed to operate as commercially viable utilities, requiring no long-term subsidization. In addition, they can provide a concrete, visible contribution to disaster recovery assistance.

The integrated units are not fixed configurations—they must be adapted to each site. They use renewable energy sources to the maximum extent allowed by local geography. They supplement this with thermal energy generated from the most viable local fuels (gas, diesel and/or biomass). Some fossil fuel use is usually necessary to ensure reliable power. They minimize the environmental impact by using the latest, fuel-efficient generators, and then re-using the waste heat to purify water. One can get both electricity and clean water from the same liter of fuel required. This reduces the cost of both, as well as the overall level of fuel consumed. The presence of reliable electricity will enable households to shift away from wood and charcoal cooking, which currently is a leading cause of deforestation in developing countries. Such units can also substitute for dams, providing reliable power without destroying riparian ecosystems. Finally, the units provide "industrial strength" power (3-phase, 480 volts or higher) that can drive and attract larger industries and businesses.

In order for these smaller utility units to be viable as local investments, their management must be systematized down to the last detail. Management techniques used are adapted from the lessons learned by franchisors. The contractor proposes to improve the management success rate of small units to make them competitive with the current large-scale approach. Thus the advantages of scale come through many units rather than one large one. This also allows the project to leverage local investment, estimated at 10-20% of capital costs, with commercial and international financing.

It is important to view integrated infrastructure facilities as supplements to larger, central installations, not a replacement for them. Strong regional or national economies need both for stability, productivity and resilience. When properly included in a balanced, national-level economic and environmental strategy, integrated facilities can offer substantial benefits to the entire country, not just the host community.

The Benefits of Distributed, Integrated Infrastructure

DII boasts many benefits over large-scale projects. Through a highly replicable, cost effective model, communities may attract domestic private-sector capital for investment in and management of infrastructure serving populations from 5,000 to 100,000, avoiding the need to invest in long-gestation, multi-million dollar mega-projects.

DII stimulates local involvement and economic development, slows urban migration, reduces environmental impact for similar levels of service and promotes reinvestment of domestic capital in areas traditionally financed by foreign sources. The installation of an integrated platform in a typical community of 5000 will inject at least \$70,000-\$100,000 into the economy immediately, in materials and the labor paid to those who set it up, wire houses and businesses, build and service plumbing and rent telephones. The unit itself will need a staff of approximately five long term employees, but many others would be employed in businesses made possible by reliable utilities.

Specifically, the DII approach has the following social, economic and technical benefits:

- Infrastructure can be developed, financed, operated, and maintained entirely by the private sector.
- Four or more infrastructure elements can be provided simultaneously (not sequentially over several years) delivering electricity, wastewater treatment, potable water, telecommunications and vital health and education components.
- Basic infrastructure components are highly visible and can be placed in operation in a very short time—typically less than two months from arrival on site. Communities provided with ample, reliable infrastructure serve as "magnets" to attract people and discourage migration to overcrowded metropolitan centers.
- Integrated infrastructure facilities require significantly less initial investment than large, centralized ones. They can be privately financed and locally owned, allowing more of the revenue stream to remain within a local economy, rather than being repatriated by foreign owners and investors.
- Reliable infrastructure is a key to attracting additional industry and investment to a community.
- Decentralization offers substantial reliability improvements over existing infrastructure systems at the local level.

- Localized infrastructure is an investment that can benefit several communities. Properly designed systems can be mobile and used for "leapfrogging."

DII also promotes enhanced environmental quality:

- Localized systems eliminate the need for the significant deforestation associated with right-of-ways for long-distance transmission lines.
- Long transmission and distribution lines result in substantial power degradations (I^2R losses) which require additional fuel consumption at central generation facilities to make up for the resulting irrecoverable losses. This increased fuel consumption results in added thermal and combustion emissions released into the atmosphere.
- Some sources cite wood gathering as the single greatest threat to tropical forests. Inexpensive, readily available electrical energy for lighting, heating and cooking, as well as a large supply of potable water will greatly reduce the pressure on tropical forests placed on them by woodcutters.
- Integrated systems depend on a proven hybrid generation capacity, capitalizing on local renewable energy sources, including micro-hydro, solar and wind generation capacities.

How Does Distributed, Integrated Infrastructure Achieve RAISE's Core Objectives?

Raising rural incomes depends as much or more on timely market access for inputs and outputs as on improving agricultural methods. Reliable electricity, water and telephone/internet service help with both. Many farmers in isolated areas of Central America currently lack access to one or more of these basic services. Integrated infrastructure development offers timely, cost effective, environmentally sound solutions for meeting the critical electrical, water, telecommunications, health, sanitation and even transportation needs of rural communities.

Immediate access to critical technology and services will stimulate growth and raise rural incomes. This will happen gradually if the facilities are just installed and people left to their own devices to discover how the services can be used. That process can be accelerated, however, by widening the equity stakeholders to include the community itself. When the community participates in the decision to extend service, invests in the utilities, has access to the full capabilities on a fee-for-service basis and participates in public discussions and demonstrations of the capabilities of these new services, the economic growth can start sooner and accelerate faster. The community, in effect, becomes a full-service small business incubator.

Among the aspects of agricultural economies that are improved with reliable infrastructure are the following:

- Timely provision of inputs. Late seeding, fertilization and pest treatment is wasteful and ineffective. Timing is everything, and being able to make a telephone call can save a week's trip.
- Economic viability of supplemental irrigation. Electric pumps are cheaper, more reliable and more portable than diesel or solar pumps. A small amount of supplemental irrigation in time can mean saving an entire crop.
- Timely marketing. At least 10 percent of post-harvest losses typically occur as crops sit waiting to get to market. Again, telephone contact with shippers can save the day.

- Decisions on what crops to grow. Access to timely global market information, technical information on how to grow crops and where to get genetic material will, over the longer term, produce more sophisticated and varied cropping choices.
- Access to off-season work. Reliable communications provide rural populations with a wealth of information on off-season jobs, as well as how-to guides for crafts, craft supplies and marketing.
- The combined effect of these innovations is to increase year-round productivity and incomes.
- Post-harvest processing. Crops can be canned, frozen, or otherwise processed to enhance marketability.

For the areas in Central America recovering from Hurricane Mitch, the integrated infrastructure concept is the ideal rapid response. It provides a timely, visible response to pressing human needs, and results in sustainable, long-term solutions to often chronic problems. Target communities include the outskirts of Choluteca and Cofradia in Honduras, and San Marcos de Jinotega in Nicaragua. Potential private-sector partners have expressed interest in supporting projects in both areas in response to need expressed by the communities.

Facilitating Community Economic Development

The contractor proposes to incorporate a Community Business Development Plan with its infrastructure units for two reasons. First, the economic growth that it sparks is good for the community. Second, economic growth increases the demand for electricity, water and telephone services, so it improves the internal rate of return of the owner/operator. A key advantage of the private sector, distributed development approach is the link it creates between the community and the private owner/operator. It motivates both to ensure the community's growth.

Leveraging Domestic Private Sector Resources for Community-based Development

The viability of an integrated infrastructure project is critically dependent on the ability to keep the cost and institutional, bureaucratic and regulatory obstacles to a minimum. More traditional privatization models (i.e., Build-Own-Operate and other variants) that have become popular in the last ten years put the initiative in the hands of governments to place tenders on the open market and allow foreign and domestic owner/operators to bid for concessions. The legal structures defining these agreements have become extremely complex and expensive, and frequently lead to accusations of "re-colonization" by foreign firms.

The DII approach is different. While the option needs to be open for municipalities and government levels to take the initiative on DII projects, more often projects will need to be driven by the domestic private investors rather than foreign firms or the public sector. The municipal and state level governments that represent the types of communities that are ideal candidates for integrated infrastructure projects typically will have neither the experience or wherewithal to initiate such projects. Country specific models must be developed to simplify this process.

Benefits Beyond the Community

DII brings benefits to a broad cross-section of society. Users, municipalities, national power authorities and investors stand to benefit from smaller, more responsive installations. This project will demonstrate those benefits in the following ways:

Stakeholders	Benefits Received	Method/Means
Rural Municipalities	<ul style="list-style-type: none"> • Provided with methodology for attracting, contracting and evaluating private investors to meet needs for infrastructure • Provided with a community business development plan to promote economic growth. • Provided with the means to evaluate efficacy, applicability, and probable success of integrated power, water and telecommunications infrastructure 	<ul style="list-style-type: none"> • Accomplished through the site survey and evaluation process. Final product is a complete package including technical information, designs and financial analysis. • Accomplished through the design and delivery of financial models, regulatory examples and criteria for evaluating investors. • Accomplished through the participatory development of a Community Business Development Plan, and town meetings.
Private Investors	<ul style="list-style-type: none"> • Provided with concrete feasibility studies for investment in distributed infrastructure at the community level • Provided with detailed explanation of regulatory and commercial environments • Involved in site selection and site development process 	<ul style="list-style-type: none"> • Accomplished via distribution of feasibility studies developed during the site survey process. • Accomplished through delivery of samples of the regulatory framework and meetings with regulators and community leaders. • Accomplished through participation in the site selection process and community meetings.
Consumers	<ul style="list-style-type: none"> • Provided with a clear example of how private sector investment can 	<ul style="list-style-type: none"> • Accomplished through transparency of site selection process, outreach

	<p>provide them with clean, efficient, reliable infrastructure.</p> <ul style="list-style-type: none"> Provided with infrastructure that will stimulate rural economic activity in both short and long term. 	<p>and community meetings with regulators, investors and government officials.</p> <ul style="list-style-type: none"> Accomplished through the distribution of electricity, water and telecommunications.
Regulators	<ul style="list-style-type: none"> Provided with a clear example of how DII can add to the national portfolio of solutions to meeting the demand for infrastructure without significant public expense. 	<ul style="list-style-type: none"> Accomplished through the distribution of sample agreements, cash flow analysis, and regular informational meetings with communities and investors.
USAID	<ul style="list-style-type: none"> Provided with a model for attracting private sector investment to development of DII applicable throughout the country and region. Provided with a clear example of how infrastructure stimulates significant rural economic growth. Provided with a clear example of how distributed infrastructure stimulates alternative agricultural activities. 	<ul style="list-style-type: none"> Accomplished through final reports and observation of the process. Accomplished through the evaluation of baseline economic data collected during the site survey process as compared to data collected one year after the initiation of services. Accomplished through models and templates, which can be used by other communities. A clear example in the national business community of a financially viable project.

Proposed Pilot Distributed Infrastructure Projects Under RAISE

The purpose of this project is to use the RAISE IQC to fund the establishment of the framework to encourage private sector initiatives to develop multiple integrated development projects. The funds would specifically be used to:

Phase I

- Finalize a detailed Workplan in concert with USAID and host-country representatives with quantifiable deliverables and a delivery schedule in accordance with local mission and host agency requirements.
- Develop national templates to address individual investment scenarios and comply with host-country legal regulatory requirements.
- Establish community selection criteria and community assessment protocols.
- Apply criteria to site selection process.
- **Decision Point II**
- Customize community business development plans, technical designs and feasibility studies for selected communities.
- **Decision Point II**

Phase II (Optional – Normally Paid by Investors)

- Provide operations and management training to project operators.
- Conduct initial site development which includes wiring houses, setting up water sales and/or plumbing to pipe water to distribution points and some homes, installing the telephone system and selling both phones and phonecards.

Phase III

- Implement community business development plans.
- Monitor and evaluate projects using readily available indices.
- Report results to investors, the contractor's management team, USAID and the communities served.

II. Tasks to be Performed Under This Task Order

II.A Phase I

II.A.1. Workplan

The field team's first task will be to finalize a detailed Workplan in concert with USAID and host-country representatives. The Workplan will have quantifiable deliverables and a delivery schedule in accordance with local mission and host agency requirements. The steps identified in the Phase I Workplan will include, but not be limited to: a) developing an in-country presence, b) developing community selection criteria and community assessment protocols and tools, c) designing a national template including legal, financial and regulatory structures, d) applying the community assessment and national templates to specific communities and finally, e) conducting site-specific surveys for qualifying communities, yielding a detailed Feasibility Study for each, along with conceptual engineering designs and an individual Community Business Development Plan. The Workplan will involve the investors, regulators, and users from the inception of the project, so that all actors have a sense of ownership.

Level of Effort (LOE) Breakdown for Task		
Task: Develop Work Plan	Position/Title	Days
Develop Specific Work Plan	COP	20
	Project Director (US-based)	20
Establish in-country Presence	COP	10
	Project Assistant (Local Hire)	20

II.A.2. Developing Community Selection Criteria and Community Assessment Protocols

Successful implementation of distributed development requires careful consideration of many factors. While distributed development is a viable solution for over forty-percent of the communities in most emerging economies, not every locale is a candidate. Selection of the wrong communities as demonstration projects can set distributed development back many years in a given country.

The criteria for communities most likely to benefit quickly from distributed infrastructure need to be refined for each country. The process begins by articulating country-specific macroeconomic criteria to identify suitable zones of economic activity. These will be zones on the periphery of the main market economic axes, and/or isolated sites that have a special site need for electricity, such as an interior plantation zone, factory, or tourist facility. Other key factors include a workable legal and regulatory framework in the country, reasonable security of persons and goods, reasonable accessibility for fuel deliveries and maintenance support.

The most important criterion is having adequate cash flow within the community so that one can assume some paying customers from the start. The site must also show a significant potential for economic development. Another equally important factor in overall project success is having a

community that wants the project and is able to organize to participate. This step will establish the criteria to equitably judge a community's level of enthusiasm. Because this organizational dynamism is so critical, pre-selection of sites cannot be definitive. Community interest has to be demonstrated and the communities given time to mobilize investors, businesspeople and community leaders around the project.

To facilitate the lender/investor/community partnering process, the contractor will develop criteria for suitable local investor/operators at the same time as the macroeconomic site analysis. This is done with the objective of involving the most suitable candidates in the site development process. Among the most important criteria for potential investors are:

- At least three years business experience, with no bankruptcies or loan defaults (with special consideration given to those whose losses stem from Hurricane Mitch);
- Audited accounts for previous businesses;
- Cash available to invest, minimum 10 percent of capital costs;
- Willingness to sell small shares to community shareholders for another 10 percent of capital costs, ability to maintain transparent accounts for the same;
- Technical capability to train staff and maintain good work discipline;
- Ability to work with a community that fits the site selection criteria.

Level of Effort (LOE) Breakdown for Task		
Task: Develop Site Selection Criteria	Position/Title	Days
Task Preparation	COP	5
	Project Assistant (Local Hire)	5
Pre-workshop Preparation	Workshop Participants (5)	.5/2.5
Criteria Development Workshop	COP	3
	Project Director	3
	Workshop Participants (5)	3/15
Finalization of Criteria	COP	10
	Project Assistant (Local Hire)	10
Review and Comment	Workshop Participants (5)	.5/2.5
Publish	COP	4

II.A.3. National Template: Legal, Investment, Financial, Environmental

Financial and Investor Package Task

While the community selection criteria are being established, national and local investment conditions must be applied to individual investment scenarios. This task will fully develop models for two areas critical to the success of private participation in DII. Specifically, this task will develop concrete models for: a) organizational structures most likely to provide the capable administrative and managerial stability and the financial creditworthiness required for sustainable operations given the national legal and regulatory conditions, and b) capitalization structures

reflecting the organizational and capital market realities within the corresponding target country and communities.

Financial package options, ownership structures, including a private operating company organized under local laws, as well as municipal, industrial or national level ownership will be defined and result in a series of templates to be applied to specific sites during the individual "site survey" process. Transitional ownership structures and agreements will also be considered.

The key element of this task group is to design realistic capitalization structures that reflect the realities within the corresponding capital markets, including the demonstration of adequate revenue flows to amortize debt, provide an acceptable return to equity investors and allow for sufficient reserves to maintain the project's physical infrastructure. A survey of potential financing sources will be conducted, including local and international banks, multilateral and regional development agencies, trade finance entities, export credit agencies, sector and geographic specific investment funds and similar potential funding sources. The financing parameters and requirements of those sources deemed most likely to provide funding will be carefully considered against the local potential to structure projects that meet such requirements.

On the private equity side, parties will be identified which have the financial and administrative ability to serve as capable project sponsors. This would include local businesses, individual entrepreneurs and other groups that have an interest in pursuing such projects and are willing to commit requisite amounts of risk capital. Consideration will also be given to the credit enhancements available in support of such parties, such as bank guarantees, credit insurance, collateral, and so forth.

For the consideration of public entities as project sponsors, or a partnership between one or more public and private groups, capitalization and administrative structures will be formulated that provide adequate project equity, credit enhancements, as needed, and an ownership formula that ensures a "market" approach to operations by a qualified sponsor entity. To ensure sustainability, care must be taken to design financial and operating approaches that provide on-going profitability, minimize subsidy elements not operationally reimbursed to the project and avoid bureaucratic entanglements with public regulators and similar entities.

With this approach, financial models will be developed for several different approaches to project ownership and sponsorship, depending upon the realities of the local environment and the structuring and return requirements of likely funding sources, both for debt and equity.

Task II.A.3. will involve two key elements to institutionalize the development and application of key business models. Firstly, the contractor will develop informational seminars for finance entities, both at the commercial and the sectoral levels. These will be followed by informational seminars involving investors and lenders. Secondly, the contractor will develop a series of seminars to introduce local business service providers with an introduction to critical business models involved in the privatization of distributed infrastructure, and its impact on sustainable economic growth.

Level of Effort (LOE) Breakdown for Task		
Task: Develop Financial and Operational Models	Position/Title	Days
Design and Orientation	Economist (Local Hire)	5
	Finance Specialist (US)	5
	Finance Research Assistant (US)	5
Data Collection/Analysis	Economist (Local Hire)	15
Template Development	Economist (Local Hire)	5
	Finance Specialist (US)	5
	Finance Research Assistant (US)	5
Ground Truth/Verify Applicability of Templates	Economist (Local Hire)	5
	Finance Specialist (US)	5
	Finance Research Assistant (US)	5

Legal and Regulatory Issues Task

The national template will also cover the legal and regulatory issues that must be addressed in preparation for the development of an Integrated Infrastructure Platform and subsequently by the owners of the facilities after completion of construction. The task involves the conduct of a thorough evaluation of all laws and regulations pertaining to a platform as a whole and to each of its individual components and the services to be provided. Although it is anticipated that the national template will cover the majority of regulatory matters, it will also be necessary to conduct a review of regulatory provisions that may exist at the local level. Locally enforced regulations are assumed for the present, to be uniform in application throughout the involved countries. A partial list of regulatory issues that may need to be addressed is outlined below.

Platform Element	Prospective Regulatory Provisions
Entire Platform	Business license Site approvals for zoning/land use controls Building permit Environmental Impact assessment Discharge/emissions standards
Water Service	Water resources controls ground/surface water abstraction riparian issues Irrigation controls Public health (treatment standards) Price controls (if distributed through network)
Electricity	Concession/franchise (i.e. Independent Power Producer or Power Purchase Agreement, may be required if tie to national distribution system is included) Navigation regulations (micro-hydro) Rate/tariff controls Service standards

Telecom	Licensing - service area Access, interconnection and revenue sharing Price controls Service standards
Health Services	License for clinic and controlled substances Certification of health care providers

The preceding list is intended to be indicative of the types of issues to be investigated during the preparation of the national template. It will provide a starting point in addressing the regulatory issues for individual platforms as they approach the implementation stage. The applicability of various regulatory provisions will depend in large part upon the specific characteristics of the individual platforms. The task's deliverable will consist of a detailed and comprehensive presentation of regulatory provisions, application and approval processes and potentially applicable waiver provisions.

Development Effort (1.1b): Breakdown by Task		
Task: Develop Legal and Regulatory Templates	Position/Title	Days
Design and Orientation	Senior Legal Expert (US) Regulatory Lawyer (Local Hire)	5 5
Data Collection/Analysis	Regulatory Lawyer (Local Hire)	15
Template Development	Senior Legal Expert (US) Regulatory Lawyer (Local Hire)	5 5
Ground Truth/Verify Applicability of Templates	Senior Legal Expert (US) Regulatory Lawyer (Local Hire)	5 5

II.A.4. Apply Criteria to Site Selection Process

Site Selection and Survey

The Chief of Party will work with investors, the Mission and host government to develop a specific list of potential sites and select the most viable from among them, relying partly on the community's ability to organize a response.

Macroanalysis

The first step in applying site selection criteria is to use the economic-geographic criteria developed in Task II.A.2 to select zones in which communities appear to be well suited to be sites. The Chief of Party will rely principally on local consultants and universities to complete this Task. The documents needed will be the best available maps of economic activities, the latest census and/or household budget survey, maps of the current electrical grid and a report of its operations, and an inventory of major planned investments from the investment promotion center.

Using the criteria developed in Task II.A.2, the universe of communities in need of infrastructure and economic development will be narrowed to include a "short list" of those that most closely

match the conditions appropriate for success using private sector investment. Participation by potential lending institutions will be critical at this step. This process will involve not only evaluating socioeconomic data, but will consider political factors and intangibles such as entrepreneurial spirit on the part of both local government structures as well as the general population. The end result will be the identification of a select group of communities—probably ten to twenty—most likely to succeed in both short and long-term economic development. This will be largely a paper exercise, conducted regionally.

A brief series of informational meetings involving both local and national level participants will be critical to ensure transparency in the process, and provide ample opportunity for communities as well as investors to demonstrate commitment and buy-in to the concept of infrastructure as a basis for sustainable economic development. These meetings will include presentations to explain the site selection and evaluation process. Partner organizations include indigenous lenders, NGOs, Municipal and Mayors' Associations, national community development entities, representatives from the national power utility and infrastructure planning offices, and universities.

The COP, accompanied by potential investors, lenders and/or USAID personnel, will then personally hold a meeting at each site. This team will evaluate many of the subjective criteria that play critical roles in successful projects. On the basis of this team's evaluation, the list of candidate sites will be ranked in order of potential for economic growth and suitability to manage a project. The list will be narrowed to five principal and three alternate sites by selecting the top five ranked candidates. To obtain fair and consistent rankings, it is important that the members of this evaluation team be consistent throughout this process.

Level of Effort (L.O.E) Breakdown for Task		
Task: Apply Criteria to Sites	Position/Title	Days
Macro-analysis/Data Collection	COP	15
	Assistant (Local Hire)	15
	Local Consultant	10
	Local University/NGO (2)	15/30
Lender/Investor Seminar	COP	3
	Project Assistant (Local Hire)	3
Site Selection Visits	COP	20
	Project Assistant (Local Hire)	20
	Local NGO/PVO Representative	20
Decision Point Meeting with USAID	COP	2
	Project Director	2
	Local NGO/PVO Representative	2
Publication/Translation of Findings	Project Assistant (Local Hire)	1

Decision Point One: At the end of this step, the Mission and the contractor will evaluate the potential for carrying out the next step of the contract and will reach an agreement on whether to proceed and on any modifications to the strategy based on what is learned up to this point.

II.A.5 On-Site Surveys: Customized Community Business Development Plan, Technical Designs and Feasibility Studies for Selected Communities

This task will produce the Community Business Development Plan, Technical Design and Feasibility Study necessary to attract private capital to invest in the integrated projects.

The contractor will select and train a six-person multidisciplinary team to visit the five sites selected in the Task II.A.4. Four Team members will travel to perform the Surveys, which typically require one to two weeks per site, depending on community size. The Survey Team will cover each of the sites in one trip to minimize cost and obtain maximum efficiency of the process. The traveling Team will consist of a power, water, environmental and economic development specialist. The team works closely with local officials and leaders to: 1) collect data, 2) develop a growth strategy for the community, 3) interactively develop the technical design, and 4) thoroughly develop financial projections and analyses. The on-site Team will employ two host-country nationals as local technical support staff, as well as coordinate with relevant professionals from each municipality. Two remaining Team members will stay at the contractor's facility to interactively coordinate the design and analysis with various suppliers.

Team Building/Alignment

Prior to going to the field, the contractor will conduct a four-day training session to prepare the Team. Team participants will be experts in their fields; the training is designed to ensure that all are working in concert with each other in the field and with the Support Team remaining at the contractor's headquarters. There will also be a group of alternates and student/faculty data takers trained at the same time. The field team and alternates to be trained will include contractor technical and economic development specialists, Morehouse College faculty and student interns.

Topics will include, among others:

1. Participatory rapid appraisal methodology,
2. Technical parameters,
3. Environmental parameters,
4. Country familiarization, including legal and regulatory systems, cultural factors, etc.
5. Site familiarization
6. Collaborative communication systems and protocols.

The main tools field teams will need to use comfortably include the following:

Economic Development:

- Economic geography, macro and micro scales;
- Inventorying local businesses and resources;
- Hand-drafting maps, time-charts, and cross-sections based on visual observations and group walking tours;
- Community meeting facilitation and feedback processing;
- Analysis of social structures and processes from verbal information;
- Focus groups (men, women and youth);
- Wealth Ranking;
- Key informant interviews;

- Household interviews.

Technical and Environmental:

- Power system requirements
- Existing load assessments
- Anticipate load growth predictions
- Renewable energy assessments
- Water sampling and testing
- Watershed assessment
- Telecommunications assessment
- Industrial and agricultural support requirements
- Soil and air quality burdens and impact assessments

The team will agree on an outline and draft tables for the final report before going to the field. While the methods of information gathering are less formal in rapid appraisal methodology than when using survey questionnaires, the information required must be clear to all. Hence the need for a standard format for the final report.

Once in country, the Team will hold a two-day workshop for lenders, potential investors and local assistants and any Mission personnel who will participate in the surveys. This workshop will familiarize these local participants on objectives, methodologies and expectations.

Site Survey Method

The first step at a site is to arrange entrance meetings with the community. The COP will explain the project community members, answer the initial questions and present the team's work plan which should enhance participation on the part of local residents.

The Team's typical day will include a brief morning meeting to review with community leaders the day's objectives. The Team leader will give members their assignments, and the Team will split up as appropriate to carry out its assignments. Team members will report to the Leader periodically, and the leader or an assistant will communicate often with the Support team to report design data, ask questions or make requests of various supporting organizations and vendors. The team will meet as a group in the late afternoon to give their reports, send in new requests, and to analyze progress. The leader will work with community leaders and others to develop the next day's schedule and to give evening writing assignments to Team members.

The first exercise in a Survey will be a walking tour and mapping exercise, conducted with the community leaders. The Team creates sketch maps and cross-sections of the village or urban neighborhood that document all of its key resources. Then they conduct focus groups with men, women and youth, each focusing on their current economic activities and how electricity, clean water and telephone service could be useful to them. Out of those will come an inventory of economic activities, a seasonal calendar of cash flow, and an idea of the daily energy demand peaks and troughs.

Team member(s) will inventory local artisans and business people, and select some of them for key informant interviews. Among those selected will be the ones most likely to benefit immediately: installing wiring and piping, selling electrical appliances, establishing rented cold storage lockers,

irrigating using electric pumps. The Team will look for someone capable of and interested in operating a business center. This is a natural core business, as the utilities need a computer and internet connection for management, but their full capacity will not be utilized by the infrastructure hardware alone. The computer and telephones will serve the largest population if they are part of a business center, operated by a local, computer-literate businessperson. If such a person does not exist in the village, the invitation for expressions of interest can be extended to out-migrants from the area currently in urban areas or overseas, or simply through the national press.

Team member(s) will conduct a Wealth Ranking exercise, using the method developed by Barbara Grandin, with the primary criterion being cash income. This gives a database in which all families in the village are ranked in the bottom, middle, or top third of the community, according to income. The economic development specialist then interviews a random sample of families in each category, noting what they currently spend in cash and expend in labor on fuel, water and communications. She discusses with them how the new services would work and learns how they think that they would use them. This may affect how the distribution of power, water and telephone are all organized, as well as help estimate the current level of demand. The private household interviews also sometimes bring out histories of conflict that may be glossed over in public meetings. Most communities have internal conflicts. The Team will evaluate whether these are serious enough to affect the success of the project.

Community Business Development Plans for Sustainable Growth

The last step in the survey process is the most important. The Team Leader will lead a comprehensive exit meeting with community leaders, the lenders and other participants. The economic specialist will present the draft Community Business Development Plan, and present its main findings, particularly areas of economic opportunity for discussion. The technical specialists will then present their conceptual design for an infrastructure package to support the Business Development Plan. Often, the identification and the articulation of business opportunities is often enough to trigger a spurt of development in anticipation of the arrival of electricity and telecommunications. Through the eyes of an outside consultant (from outside of the community) residents often suddenly see their community and themselves in a new light. They become aware of the human and economic resources available to them. Following this event, the feedback provided by community members is incorporated into the plan.

When the Site Surveys and community feedback process are completed, the Team returns to the contractor's facility and completes the design and analyses. An independent group of engineers reviews the results, as does a local legal specialist, to avoid shortcomings in the final product.

The deliverables for this Task include an individualized set of two documents for each site. Each document set consists of a *Community Business Development Plan* and a *Technical Design and Feasibility Study*. The *Community Business Development Plan* presents community representatives with and infrastructure owner/operators with a comprehensive plan for community growth – a plan developed in a participatory manner involving those most likely to both stimulate and be affected by positive economic development. Sections of the Plan include: Executive Summary; Social and Political Structures; Analysis of Resources; Economic geography of the site (i.e., external markets); Inventory of business activities, present and future; Analysis of Electricity, Water and Telephone Markets; Financial Projections and Analysis; Plan of Action; Benchmarks; Maps, Photographs, Survey Data and Analysis.

The *Technical Design and Feasibility Study* gives complete technical specifications for the infrastructure unit which corresponds to the *Community Business Development Plan*. It contains: Summary Technical Description; Initial Conditions Matrix; Equipment List; Engineering Drawings; Operating Cost and Revenue Tables; Fabrication, Shipping and Testing Requirements; Environmental Impact Assessment and, Financing Documents and Permits. The Technical Design and Feasibility Study will also include as appendices separate sections with comprehensive Maintenance, Training and Administration and Management Plans for the Owner/Operators. These Plans will be developed for local conditions, regulations, language, etc. by a separate team of experts who will be working in parallel with the Survey Team and under the cognizance of the contractor's chief design engineer.

Once the Surveys and Documents are completed, the COP and a technical representative will hold a series of well-advertised workshops for various interest groups within the country. These include, but are not limited to Mayors, Governors and other government officials, NGO's, Regulators, Financial Community and Investors. They will work closely with lending, regulatory and other key institutions to promote investment and with the private sector to offer tenders.

Level of Effort (LOE) Breakdown for Task		
Task: Site Surveys/Design and Feasibility	Position/Title	Days
Pre-survey, site-specific Data Collection	Local NGO/PVO/University (3)	15/45
Site Survey Team Training Preparation	COP	10
	Project Director	10
	Project Assistant (Local Hire)	10
Pre-Survey Team Training	COP	5
	Project Director	5
	Survey Team (6) (see below)	5/30
	Project Assistant (Local Hire)	5
Site Survey (for five sites @ 1 week/site)	COP	37
(this is an incremental LOE, and can be modified by the number of sites surveyed)	Project Assistant (Local Hire)	37
	Local NGO/PVO Representative (2)	34/68
	Power Engineer	36
	Water Engineer	36
	Environmental Engineer	36
	Development Economist	36
	Design Chief (located in US)	34
	Design Assistant (located in US)	34
Maintenance and Operation Guidelines	Design Engineer	20
Administration and Management Plan	Management Specialist	20
Training/Staff Development Plan	Master Trainer	20
Permitting Plan	Permit Specialist (Local Hire)	10
Post Survey Reports (one per site surveyed)	COP	45

D R A F T

(Community Business Dev. Plan Design and Feasibility Study, Environ. Assesment) Local Legal Review Presentation of Surveys to Investors/Comm.	Engineers/Economist (4)	22/88
	Design Chief	22
	Design Assistant	22
	DesignReviewers/TroubleShooters (2)	22/44
	Local Lawyer	10
	COP	15
	Master Trainer	15

II.A.6 Phase I Final Review and Report

This task will review the effectiveness of Phase I and result in the evaluation of the Phase I process, resulting in a final report to USAID, including “best practices” and “lessons learned,” to be submitted within two months of the completion of the task.

Level of Effort (LOE) Breakdown for Task		
Task: Final Review and Report	Position/Title	Days
Phase I Review Workshop	COP	3
	Project Director	3
	Project Assistant (Local Hire)	4
Draft Final Report	COP	15
	Project Assistant (Local Hire)	15
USAID Review and Comment		0
Finalize Report and Publish	COP	2
	Project Assistant (Local Hire)	5

Decision Point Two: At this point, the contractor expects to work with the communities, investors, financing institutions and suppliers to initiate contracts for distributed development packages for the sites surveyed. The purpose of this project is to attract domestic private sector investors. Therefore most of this activity goes on outside the scope of this Statement of Work. The results of this process determine which steps of Phases II and III are necessary to ensure successful implementation of the subsequent projects. The contractor and the Mission will evaluate the next steps and determine how to implement them.

II.B. Phase II – Procurement, Training and Site Preparation*

(*Note: This Phase is included in this proposal as an option. It also demonstrates what will be done during this phase, regardless of who is funding it. Ideally, Phase I (funded through the RAISE IQC) will attract private sector capital and that capital will go toward funding the steps in Phase II. Should the Mission decide to use RAISE or any other funding source to become involved in hardware procurement (Phase II), these are the steps that will need to accompany it.)

II.B.1 Training

During the period when the units are being assembled, shipped and installed, the operators will undergo operations and management training. Training modules include one for owners and managers, another for operations and maintenance personnel. The management program will cover the following:

- organizational philosophy,
- personnel recruitment and training ,
- labor law and employee relations,
- business plan,
- pricing, accounting and financial management,
- establishing and operating a prepaid card sales network,
- monitoring systems and sales, report preparation and dissemination,
- site development, including building decor and maintenance, signage,
- marketing and advertising,
- setting up and operating a business center to provide community business services,
- community relations, health and safety education for electricity and water,
- shareholder relations,
- stimulating economic development.

The operations and maintenance training will cover the following:

- installation of platform and connections,
- installing wiring and plumbing,
- operating each piece of equipment,
- in-service training of operators,
- periodic and preventive maintenance,
- equipment amortization and replacement schedules,
- routine testing and servicing,
- general safety, and
- how to obtain advanced and emergency technical assistance.

II.B.2 Site Development

Initial site development involves wiring houses, installing meters, setting up water sales and/or plumbing to pipe water to distribution points and some homes, setting up the telephone system and selling both phones and phonecards. The COP will supervise and assist the owner/operators in all phases of this process, which will occupy the first two months of phase II.

II.C. Phase III - Installation, Operation and Management Package

(Note: Phase III assumes that some or all of the selected sites have an operating distributed development package.)

III.C.1 Community Business Development Follow-through

Both the owner/operators and the community as a whole have an interest in rapidly accelerating economic growth in the service area.

A business services center is a key component of the Community Business Development Plan. The utility will require a computer, fax machine, photocopy machine and telephone/Internet service. But these will not be needed full time. They can readily be shared with a fee-for-service business services center and a telemedicine unit in the local clinic. Making these services available to the population as a whole enormously increases their opportunities for economic growth and improved health. Therefore a vital task during the first months of Phase III will be ensuring that the business services center is set up and running smoothly, either as a secondary activity of the utility, or as an independent business sharing the utility's equipment.

The contractor will provide a Community Business Development Specialist, serving all five sites, for the first year of operation of the utilities. The Community Development Specialist will organize workshops and training sessions appropriate to the local businesses trying to expand or start-up. S/he will conduct Internet training on-site and provide brief individualized technical assistance. S/he will provide liaison with local microcredit providers and other local resources, to ensure that local businesses make full use of local and national resources. The team will make a priority of coordinating efforts with local NGOs so that cooperative relationships between operators and NGOs are established from the beginning.

Level of Effort (LOE) Breakdown for Task		
Task: Community Business Plan Execution	Position/Title	Days
Orchestrate TA delivery	Community Bus. Plan Specialist	260

III.C.2 Monitoring and Evaluation

The contractor treats monitoring and evaluation as a basic management tool. The initial site surveys provide baseline data on every index that needs to be monitored to judge the success of the project. The contractor assumes that not every site surveyed will prove eligible for an integrated infrastructure platform. Hence there will be a control group of communities that do not benefit from reliable power, water and telephone service.

Routine monitoring will consist of periodically analyzing readily available indices and reporting on them to the investors, the contractor's management team, USAID and the communities served. Quarterly reports will be produced, and a more complete annual report.

D R A F T

After the first year of operation, a full participatory site survey will be repeated, preferably by the same Team that conducted the initial survey. The Team will survey each operating site, and at least one site that not selected and that can serve as a control group. This survey will probably involve one week per site for no more than three field workers. The local owner/operator will participate if possible. This "one-year later survey" will provide rapid, direct feedback on how well the utilities are serving the community and whether the efforts to jump start economic growth have paid off.

Finally, this task involves establishing baseline data by which economic development will be measured over time. The task will end with the presentation of a Phase III Final Report.

Level of Effort (1.0F) Breakdown for Task		
Task: Monitoring and Evaluation	Position/Title	Days
Develop M&E Criteria	M&E Specialist	30
One-year-after Survey	Field Data Collector (8 days/6 sites)	48
	Field Data Collector (8 days/6 sites)	48
	Field Data Collector (8 days/6 sites)	48
Finalize Report and Publish	M&E Specialist	15
	Project Assistant (Local Hire)	5
	Field Data Collector	15
	Field Data Collector	15
	Field Data Collector	15

III. Key Personnel

Robert Blenker, Chief of Party is an experienced overseas development manager, a fifteen-year veteran of grassroots development programs in Latin America, Central Europe and the Former Soviet Union. He has a Bachelor's Degree in Natural Resource Administration from Ohio State University in Columbus and a Master's Degree in International Administration, with an emphasis on Business and Development Economics from Ohio University. He speaks fluent Spanish, having served as a Peace Corps Volunteer in Costa Rica for three years. He is an accomplished development administrator with contacts throughout the region. He was a Peace Corps staff member in Honduras, Nicaragua and Uruguay, and then served as Peace Corps Mission Director in Uruguay and Argentina, and in several NIS countries.

Mr. Blenker field tested, evaluated and implemented several new project-based programming initiatives that improved field-staff performance, increased accountability and increased the quantifiable accomplishments of grass-roots environmental, fisheries and small business development projects throughout Latin America. In addition, he successfully implemented effective, broad-based strategic planning training which institutionalized key project management tools in Central Asia.

Richard H. Ector, President and CEO of TVIG, will serve as the Project Director. Mr. Ector has 15 years experience in the power industry in progressively responsible management positions for the U.S. Navy, serving as Chief Engineering Officer for a nuclear submarine, and ten years as a senior power plant manager for the Tennessee Valley Authority (TVA). Along with maintenance and operational management responsibilities at TVA nuclear plants, Mr. Ector developed and fully implemented major management systems, including: an outage planning program for the world's largest nuclear plant; a regulatory mandated program to review and revise all seismic supports for a large nuclear plant prior to initial startup; and, a financial management system for TVA's Office of Nuclear Power. Mr. Ector was also Chief Financial Officer for TVA's Office of Nuclear Power, which had \$18 billion in assets and a \$750 million annual budget. Mr. Ector held the position of Assistant Site Director at Watts Bar Nuclear Plant and was certified as a Senior Reactor Operator.

Mr. Ector moved to the U.S. Department of State in 1986 and served two postings as a diplomat overseas, with considerable time in Europe, Asia and Australia, where he dealt with senior officials responsible for energy policy.

While at the State Department, Mr. Ector also managed a program to develop practical ways for teams to use information technologies to effectively manage global scale projects. Working with the largest corporations in the information technology field, Mr. Ector developed techniques and insights for managing the human aspects of collaborative teams. This project involved two hundred people and five Federal agencies over a ten-month period. Mr. Ector received a major government award for excellence and the results of this work have been implemented in a number of projects throughout the national security sector of the US Government. Mr. Ector holds a Bachelor of Science Degree from the U.S. Naval Academy.

Sidney Eugene (Gene) Gibson is Manager of International Cooperation for the River Systems Operation & Environment Group at the Tennessee Valley Authority where he has been employed for the last 23 years. He is an engineer by training and has 26 years of experience in engineering design, business management, strategic planning, institutional development and support, government contracting, and systems engineering for TVA as well as the private sector.

Gene has worked extensively in the field of power plant design and most recently in the area of integrated natural resource development and management. For TVA's River Systems Operation & Environment Group, Mr. Gibson is currently responsible for development and implementation of TVA's international cooperation program. Mr. Gibson is a registered professional engineer, who holds a Bachelor of Science Degree in Engineering from Virginia Tech University and a Master's Certificate in Global Business Management from George Washington University in Washington, DC.

W. Earl McClure will conduct and manage development of National Legal and Financial Templates. Mr. McClure's professional career includes extensive experience in the financial and investment field, work and residency overseas and, most recently, service as chief of staff and foreign affairs advisor to United States Senator Paul Coverdell (Chairman of Western Hemisphere Sub-Committee of Senate Foreign Relations Committee). He has served in senior management positions with investment advisory firms, brokerage companies, as well as Associate Director of International Operations for the Peace Corps during the Bush Administration.

Mr. McClure founded International Projects Group, Inc. (IPG), which structures and obtains financing for international projects. Mr. McClure's experience includes a major hydroelectric project in Ecuador, business and capitalization planning for a Caribbean transportation project, financing for numerous real estate transactions, and multiple municipal infrastructure projects in Ecuador.

In addition to international project finance, with which he first became involved as a senior lending officer of the Inter-American Development Bank, Mr. McClure has held senior level positions with financial and investment advisory firms where he was responsible for the evaluation and screening of hundreds of millions of dollars of investment proposals related to new ventures, real estate, energy and similar projects. In such roles, he established detailed underwriting criteria, analytical approaches and other systematized formats for evaluating investments.

Mr. McClure obtained a Bachelor degree with a concentration in economics from Harvard College and a Masters Degree in Business Administration from Harvard Business School.

Dr. James H. Porter is the Director of the International Power Institute at Morehouse College. Dr. Porter has forty years of experience as a practicing chemical engineer, both in industry and as a professor of engineering. He is known for his development of new process concepts and for the application of computers for process design and simulation. Dr. Porter has also made significant contributions in the fields of fluidization technology, membrane permeation systems, computerized design and analysis of advanced power cycles, the development of processes to convert solid fuels to useful energy forms, and the development of pollution control technologies.

Dr. Porter's expertise extends to areas of energy use planning. During the period from 1980 to 1984 he served as Co-Chair of the team that advised the Bureau of Energy and Mines of the Government of Morocco in planning strategies to increase energy supplies and reduce energy consumption within the Moroccan economy while maintaining constant growth in economic output. These strategies were computerized and incorporated into the GOM's Five Year Plans.

In the areas of environmental engineering and consulting, Dr. Porter has served as a member and/or consultant of the EPA Science Advisory Board since 1976 reviewing matters of policy and

D R A F T

assessing the adequacy of pollution control technology. He also serves as a member of the EPA Peer Review Committee, reviewing proposals for environmental research in pollution control technology and reviewing EPA's plans for long range research at the Agency. Dr. Porter has recently been appointed by the Secretary of Energy to a three-year term as a member of the National Coal Council.

Dr. Lucie Colvin Phillips is President of IBI, one of TVIG's member firms, and TVIG's Chief Development Economist. She holds a Ph.D. from Columbia University and has twenty-five years of experience in development economics, policy reform, sociology, academics, and diplomacy. She has worked in some thirty developing countries; designing, implementing, and evaluating development programs at every level, from the state-house and line ministries to provincial and local governments to villages. Recently she has led the way in collaborative research in which all stakeholders, including policy-makers and representatives from the public and private sectors have a say in the process.

Dr. Phillips is currently Senior Advisor to the trade component of the Africa wide USAID funded EAGER project. Under the EAGER project, Dr. Phillips has conducted the Tanzania Small Scale Mining Marketing Study, which has been cited two years running in USAID's Congressional Report, and is leading to an overhaul of mining sector tax policy. Formerly a faculty member at the University of Maryland Baltimore County, Dr. Phillips continues to offer a graduate course at the Johns Hopkins School of Advanced International Studies. She is bilingual in French and English, and has varying fluency in six other languages.

Douglas W. Wilson is TVIG's Chief Design Engineer. Mr. Wilson has 36 years experience on power industry with 30 years in progressively responsible positions in TVA, which was then the largest electric utility in the United States. Mr. Wilson served as the Chief Mechanical/Nuclear Engineer for TVA. Mr. Wilson also served as the Project Engineer for the restart of TVA's Sequoyah Nuclear Plant, with responsibility for all engineering activities involving 1600 employees and \$150 million annual budget.

Since leaving TVA in 1989, Mr. Wilson has served as consultant at approximately 12 commercial Nuclear Plants and four U.S. Department of Energy sites with various engineering and management responsibilities.

Mr. Wilson holds a Bachelor of Science in Electrical Engineering from Clemson University with graduate work at University of Tennessee.

IV. Corporate Profile: Chemonics, TVIG and its Member Companies

Chemonics International Inc. is highly respected for its leadership and international project work in sustainable agriculture, natural resources management and economic growth. Since its establishment in 1975, Chemonics has provided technical assistance on more than 480 projects in 105 countries around the world. In addition to RASE, the company currently primes six IQCs with USAID/Global Bureau, one IQC with the US Trade and Development Agency, and four omnibus (task-order driven) contracts with USAID/ENI Bureau. Chemonics has completed over 85 delivery orders as a prime on previous relevant IQCs – Rural/Regional Income Generation and Resources Management IQC, Agriculture IQCs, and Environmental and Natural Resources IQC – and implemented more than 100 activities worldwide under core/buy-in contracts such as Development Strategies for Fragile Lands (DESFL), LAC TECH, GreenCOM, and Project in Development and Environment (PRIDE). Drawing on its state-of-the-art administrative, financial, and logistical systems, Chemonics will manage the Consortium's response to RAISE IQC requests for proposals and serve as the prime implementing agency for task orders.

Tennessee Valley Infrastructure Group, Inc.

The Tennessee Valley Infrastructure Group (TVIG) is a partnership of manufacturing and engineering firms centered in the Tennessee Valley of the United States. TVIG members' aggregate gross annual sales exceed \$60 million, with equipment and services supplied or operating in over 45 countries and all the world's oceans. TVIG members have joined to promote sustainable economic development through the design, development and implementation of integrated infrastructure platforms.

TVIG Member Companies

Aqua-Chem, Inc., Water Technologies Division, located in Knoxville, TN, has been manufacturing water treatment equipment since 1943, when it developed portable drinking water systems for the U.S. military in World War II. Since then Aqua-Chem has become an internationally recognized leader in the water purification industry, providing treatment systems for drinking water, seawater desalination, industrial wastewater, the chemical process industry, pharmaceutical manufacturing and other industries where high purity water is required. See <http://www.aqua-chem.com>.

CyberNational, Inc., of Murfreesboro, TN is an award winning systems integration and factory automation firm. CyberNational provides integration, instrumentation and control systems for a wide range of applications. CyberNational has provided innovative control solutions for facilities ranging from co-generation units to electric motor manufacturing to military systems to food processing.

E and I Technologies, Inc., of Oak Ridge, TN provides environmental and infrastructure services. E and I also provides services to the oil and gas industry in over 15 countries. E and I's experience ranges from liquid and solid waste treatment systems, de-mining operations in war zones and toxic chemical and radiological cleanup services for industry and governments.

International Business Initiatives Corp., of Rosslyn, VA, is a consulting firm committed to economic and social development through the modernization of infrastructure, trade, and

investment in developing countries. IBI offers services for economic and social development programs, research and training, community-based development, and information technology programs. IBI has extensive experience working with governments on policy reform and export promotion, with international agencies on donor-funded programs, and with corporations to make their investments in developing countries productive. See <http://www.ibicorporation.com>.

International Project Development Group, LLC of Chattanooga, TN is the founder of TVIG. IPDGroup provides power systems engineering, international marketing and economic development services for TVIG and other small and medium-sized firms wishing to enter international markets.

International Projects Group, Inc., of McLean, VA, provides project finance and business services to firms involved in international trade, manufacturing and infrastructure development. IPG has correspondents in over 10 countries that provide research and contacts. Founded by W. Earl McClure, International Projects Group, Inc. (IPG), structures and obtains financing for international projects. See <http://www.ipg-inc.com>.

Morehouse College/International Power Institute of Atlanta, GA, works with universities, government, and commercial organizations to render project-specific recommendations for private-sector investment considerations in the developing world. IPI strives to promote improved standards of living, energy security and environmental enhancements, to contribute to the development of regional power delivery systems, and to facilitate understanding between U.S. industry and their counterparts in developing countries. See <http://www.morehouse.edu/ipi.htm>.

Novel Technologies, Inc., of Oak Ridge, TN produces mobile and fixed medical facilities for both military battlefield applications as well as scaled down solutions for the developing world. In addition to providing healthcare systems at appropriate technology levels, Novel Technologies is a specialist in telemedicine applications for both field and base-end hospital users. See <http://www.tacticalmed.com>

Royal Industries, LLC, of Trenton, TN, is one of the 500 fastest growing firms in America. It supplies both new and refurbished telecommunications equipment to telecommunications operating companies and to business customers around the world. King Technologies has participated heavily in the restructuring of telecommunications systems in the Commonwealth of Independent States and a number of other countries around the world. See <http://www.kingtechnologies.com>.

Tennessee Valley Authority (TVA) is recognized worldwide, particularly in developing countries, for its work to develop one of the poorest regions of the U.S. It has been heralded as a model for sustainable socioeconomic development that protects the environment. TVA, created in 1933, is a U.S. federal government corporation which is the nation's largest electricity producer. As a steward of the Tennessee River basin it acts as a regional economic development agency and a national center for economic research. The TVA service area covers 80,000 square miles (200,000 square km) of the American Southeast. It provides technical support in China, Egypt, Sri Lanka, India, and Panama, and has numerous environmental research initiatives currently underway. See <http://www.tva.gov>.

V. Management: Roles and Responsibilities

The Contractor will report to the _____ USAID SO_ Team Leader. The work to be carried out will be conducted in support of SO_ objectives as agreed to between USAID and the Government of _____. The contractor tasks and responsibilities will include, but are not limited to the following:

- 1) Provide the technical assistance and expertise for the design and completion of the activities described above.
- 2) Provide all local hire technical assistance, administrative and support staff.
- 3) Procure and register vehicles and equipment (vehicle, computers, photocopiers, furniture and other relevant equipment).
- 4) Obtain all risk insurance for vehicles associated with the project.
- 5) Establish a field office in _____, adequate to house local staff, and short-term technical assistance professionals.
- 6) Arrange in-country and international travel and lodging for all personnel providing services under this task order. This would include processing all relevant visas.
- 7) Provide all reports and deliverables as described above.
- 8) Orchestrate, and conduct all meetings and workshops to be held as part of the design process: invite and coordinate participants and presenters; provide facilitation, equipment and supplies and process proceedings.
- 9) Provide health and evacuation insurance coverage for all expatriate personnel.

VI. Level of Effort and Description of Functions

Task II.A.1

Level of Effort (LOE) Breakdown for Task		
Task: Develop Work Plan	Position/Title	Days
Develop Specific Work Plan	COP	20
	Project Director (US-based)	20
Establish in-country Presence	COP	10
	Project Assistant (Local Hire)	20

Task II.A.2

Level of Effort (LOE) Breakdown for Task		
Task: Develop Site Selection Criteria	Position/Title	Days
Task Preparation	COP	5
	Project Assistant (Local Hire)	5
Pre-workshop Preparation	Workshop Participants (5)	.5/2.5
	COP	3
Criteria Development Workshop	Project Director	3
	Workshop Participants (5)	3/15
Finalization of Criteria	COP	10
	Project Assistant (Local Hire)	10
Review and Comment	Workshop Participants (5)	.5/2.5
	COP	4

Task II.A.3

Level of Effort (LOE) Breakdown for Task		
Task: Develop Financial and Operational Models	Position/Title	Days
Design and Orientation	Economist (Local Hire)	5
	Finance Specialist (US)	5
Data Collection/Analysis	Finance Research Assistant (US)	5
	Economist (Local Hire)	15
Template Development	Economist (Local Hire)	5
	Finance Specialist (US)	5
Ground Truth/Verify Applicability of Templates	Finance Research Assistant (US)	5
	Economist (Local Hire)	5
	Finance Specialist (US)	5
	Finance Research Assistant (US)	5

Task II.A.3 (cont.)

Level of Effort (LOE) Breakdown for Task		
Task: Develop Legal and Regulatory Templates	Position/Title	Days
Design and Orientation	Senior Legal Expert (US)	5
	Regulatory Lawyer (Local Hire)	5
Data Collection/Analysis	Regulatory Lawyer (Local Hire)	15
Template Development	Senior Legal Expert (US)	5
	Regulatory Lawyer (Local Hire)	5
Ground Truth/Verify Applicability of Templates	Senior Legal Expert (US)	5
	Regulatory Lawyer (Local Hire)	5

Task II.A.4

Level of Effort (LOE) Breakdown for Task		
Task: Apply Criteria to Sites	Position/Title	Days
Macro-analysis/Data Collection	COP	15
	Assistant (Local Hire)	15
	Local Consultant	10
	Local University/NGO (2)	15/30
Lender/Investor Seminar	COP	3
	Project Assistant (Local Hire)	3
Site Selection Visits	COP	20
	Project Assistant (Local Hire)	20
	Local NGO/PVO Representative	20
Decision Point Meeting with USAID	COP	2
	Project Director	2
	Local NGO/PVO Representative	2
Publication/Translation of Findings	Project Assistant (Local Hire)	1

Task II.A.5

Level of Effort (LOE) Breakdown for Task		
Task: Site Surveys/Design and Feasibility	Position/Title	Days
Pre-survey, site-specific Data Collection	Local NGO/PVO/University (3)	15/45
Site Survey Team Training Preparation	COP	10
	Project Director	10
	Project Assistant (Local Hire)	10
Pre-Survey Team Training	COP	5
	Project Director	5
	Survey Team (6) (see below)	5/30
	Project Assistant (Local Hire)	5
Site Survey (for five sites @ 1 week/site)	COP	37
(this is an incremental LOE, and can be	Project Assistant (Local Hire)	37

modified by the number of sites surveyed)	Local NGO/PVO Representative (2)	34/68	
	Power Engineer	36	
	Water Engineer	36	
	Environmental Engineer	36	
	Development Economist	36	
Maintenance and Operation Guidelines	Design Chief (located in US)	34	
Administration and Management Plan	Design Assistant (located in US)	34	
Training/Staff Development Plan	Design Engineer	20	
Permitting Plan	Management Specialist	20	
Post Survey Reports (one per site surveyed)	Master Trainer	20	
(Community Business Dev. Plan	Permit Specialist (Local Hire)	10	
Design and Feasibility Study, Environ.	COP	45	
Assessment)	Engineers/Economist (4)	22/88	
Local Legal Review	Design Chief	22	
Presentation of Surveys to Investors/Comm.	Design Assistant	22	
	DesignReviewers/TroubleShooters (2)	22/44	
	Local Lawyer	10	
	COP	15	
	Master Trainer	15	

Task II.A.6

Level of Effort (1-01) Breakdown for Task		
Task: Final Review and Report	Position/Title	Days
Phase I Review Workshop	COP	3
	Project Director	3
	Project Assistant (Local Hire)	4
Draft Final Report	COP	15
	Project Assistant (Local Hire)	15
USAID Review and Comment		0
Finalize Report and Publish	COP	2
	Project Assistant (Local Hire)	5

Task II.C.1

Level of Effort (1-01) Breakdown for Task		
Task: Community Business Plan Execution	Position/Title	Days
Orchestrate TA delivery	Community Bus. Plan Specialist	260

Task II.C.2

Level of Effort (LOC) Breakdown for Task		
Task: Monitoring and Evaluation	Position/Title	Days
Develop M&E Criteria	M&E Specialist	30
One-year-after Survey	Field Data Collector (8 days/6 sites)	48
	Field Data Collector (8 days/6 sites)	48
	Field Data Collector (8 days/6 sites)	48
Finalize Report and Publish	M&E Specialist	15
	Project Assistant (Local Hire)	5
	Field Data Collector	15
	Field Data Collector	15
	Field Data Collector	15

VII. Deliverables

<i>Deliverable</i>	<i>Delivery Schedule (from start-up)</i>
Work Plan	Month 1
Written Criteria for Appropriate Sites	Month 2
National Templates	Month 2
Community-specific Binder (including Community Business Development Plan, environmental impact study, conceptual technical design and management and training package design) for 3-5 sites.	Month 6
Investor Contract Signed	Month 6-7
Final Report for Phase I (including Evaluation Tools)	Month 7
Financial Reports	Quarterly



Trip Report, Visit to Central America
(Guatemala, El Salvador, Costa Rica, Honduras, Nicaragua)

June 21 to July 1, 1999

Submitted to: **International Power Institute**
Morehouse College and the
Tennessee Valley Infrastructure Group

Submitted by: **Robert L. Blenker**
September 10, 1999

Summary:

From June 21 through July 1, 1999 Mr. Robert Blenker of Tennessee Valley Infrastructure Group (TVIG) and Mr. Gene Gibson of Tennessee Valley Authority (TVA) visited five Central American nations meeting with private and public sector representatives as well as US Embassy and USAID personnel. The trip's objective was twofold. Firstly, the trip was to evaluate the opportunities represented by the USAID RAISE project in its post Hurricane Mitch application as a means for facilitating the installation of a prototype Integrated Infrastructure Platform (IIP) in Central America. A second outcome of the trip was to identify solid government and private sector support for a pilot IIP in the region.

Two entities were identified as solid partners in the development of an IIP in two countries, Nicaragua and Honduras. The Consejo Nacional de Energia in Nicaragua is a strong ally in developing the IIP concept. They are engaged in an aggressive rural electrification project, which includes IIP's similar to those designed by TVIG. In Honduras, Bernardo Hirsch of Comercial Laisz, the Cummins distributor, has been identified as a very strong private sector ally with broad regional influence. Through his distribution network, TVIG has the opportunity to quickly establish a prototype in one of three countries in Central America by either a direct sale or by piggy-backing an IIP unit on an existing generation set already operated by Cummins.

Meeting Highlights

Guatemala:

Meetings included USAID representatives and the Director of a larger Guatemalan development organization. The conclusion was that:

- a. The concept of Distributed Integrated Infrastructure (DII)/IIP is well accepted;
- b. That the Zona Paz would be one of the most likely areas; and
- c. USAID cannot directly fund a pilot IIP (although there is regional funding for a co-sponsorship of a pilot project), but would steer us towards grant recipients which might work with an IIP.

A meeting with the head of AGEXPORT generated interest in the IIP concept. Follow-up will be needed.

El Salvador:

The visit to El Salvador included extensive meetings with USAID, Commercial Section, IAF representatives, and the Ministry of Environment. The private sector in El Salvador is comparatively strong, and there are several opportunities for IIP development in conjunction with social responsibility clauses included in the recent round of privatization. While no

apparent partners resulted from the meeting, it was clear that the legal and regulatory framework exists for IIP's.

Honduras:

The brief visit to Honduras included meetings with USAID and the Cerveceria Nacional. Recapping the last Central American visit, the trip to Honduras reinforced the idea that the swiftest path to establishing a prototype in Central America is via the private sector. In meeting with USAID it became apparent that:

- a. Hurricane Mitch recovery funds are already allocated; and
- b. To access USAID funding for a prototype, TVIG must work through local institutions and their relationships with USAID (a very lengthy process).

Duty Greene, Mission Economist suggested continuing contacts with Mirtha Gonzalez of the Municipal Foundation, and Guadalupe Lopez, head of the Municipal Association with whom I met during my last visit. However, recent conversations with Bernardo Hirsch of Commercial Liasz suggests that he will be a strong ally in working with local investors to bring together a deal for the independent industrial zones - namely working with Jesus Canahuate of the Asociacion de Maquiladores and the Mayor of San Pedro Sula. This is the most likely channel for a short-term sale in Central America.

Costa Rica:

Meetings with Standard Fruit (Dole), the Ministry of External Cooperation

The private sector presents some interesting opportunities for IIP/DII development. The Standard Fruit Company operates extensive fruit and agricultural production operations throughout the region, which manage independent infrastructure installations. An IIP would fit nicely into their operations, although most are already supplied with infrastructure.

Costa Rica in general, however, does not present a significant opportunity for DII/IIP installation due to the fact that the national electrification grid is so extensive that nearly ninety percent of the population has access to it. Interesting to note is that José María Figueres, former Costa Rican President, is selling a clinic and educational classroom in a box not unlike TVIG's IIP/DII concept. He has been successful in selling a couple dozen of the units throughout Latin America.

Nicaragua:

Nicaragua resulted in perhaps the most interesting and productive meetings. Specifically, meetings with Humberto Guerrero Alvarez of the Comision Nacional de Energia (CNE), made it clear that DII/IIP's are a key component to CNE's strategy for energy independence and rural electrification. In their four-tiered strategy, IIP's figure strongly. Furthermore, conversations

with the Interamerican Development Bank and the Central American Bank for Economic Integration (BCIE) representatives indicate that financing for prototype development, as well as subsequent IIP installations currently exists.

Conclusions:

This trip ends the market evaluation phase. It is clear that:

- a. The IIP/DII concept is highly palatable to potential users, investors, regulatory bodies and international lending institutions throughout Central America;
- b. We have clearly identified potential distribution and implementation partners, Bernardo Hirsch in Honduras; and finally
- c. We have clearly identified public sector advocates for the concept, namely, CNE in Nicaragua.

Another outcome of this visit to Central America was to evaluate the potential for working with USAID and its grantees in the post-Mitch period. While there is a potential market, the USAID mechanism is cumbersome, time consuming and will not yield the establishment of a fully functional IIP in the near future. While we should not discount the potential for collaboration with USAID supported development projects; we can discount them as a short-term objective.

The Next Step:

The next and most critical phase for our Central American effort is to solidify our relationships with both private sector partners and government advocates resulting in the installation of a fully functional, fully evolved IIP prototype in Central America. This objective will be best accomplished via a series of follow-up meetings in both Honduras and Nicaragua. Key issues to resolve are:

- a. How to best proceed with the next phase; and
- b. To negotiate contracts with private sector representatives (Bernardo Hirsch and Cummins) and MOU's with government officials (CNE in Nicaragua).

While both nations present certain hurdles to be overcome, they present the best prospects for the rapid deployment of an IIP prototype due to proximity, availability of financing, need and legal and regulatory environment.

Trip Report
Honduras and Nicaragua
October 18 - 27, 1999

for the Tennessee Valley Infrastructure Group, Inc.

By Robert L. Blenker
~~Trip Report~~
~~Honduras/Nicaragua~~
~~October 18 - 27, 1999~~

Summary

Richard Ector (President of TVIG), Robert Blenker (Vice-president for Marketing TVIG), and James Porter (Director of the International Power Institute, Morehouse College) visited Honduras and Nicaragua from October 18 through October 27, 1999. They met with representatives of key private and public sector organizations as well as members of the US diplomatic missions with the purpose of securing clear support for IIPs.

The objectives of the trip were to a) identify a strong commercial contact in each country to champion IIPs in the region, b) obtain clear support for IIPs from government officials in the form of MOUs and letters of support, and c) clearly map out a strategy which will result in a contract for the sale and installation of at least one IIP in either Honduras or Nicaragua.

To this end, the team's efforts were most successful in Honduras. Bernardo Hirsch and Alexander Pagels of Comercial Laeisz currently operate a 20 MW distributed generation facility under contract to Honduras' national electrical utility (ENEE) and proved to be staunch supporters of the IIP concept. In addition, the team identified a solid target community, Cantaranas, and enlisted the support of Dr. Varela the Mayor and Michaela Brhem, a small business advisor assigned by the Peace Corps. Finally, Mateo Ybrin, the General Manager of the Tres Valles sugar mill has agreed to participate as an important co-investor in the project and large commercial energy client.

The efforts in Nicaragua are not as well developed as Honduras. Lacking is a strong commercial ally. While it is clear that IIPs fit nicely into Nicaragua's national energy strategy, and that there is clearly a need, we have yet to identify a local partner who has the necessary commercial connections and personal integrity necessary to promote this type of project.

Meeting Highlights:

Honduras

Meetings included various government ministers; the most important of which were the Minister of Environment, the Minister of Public Works and the Minister of the Social Investment Fund. Specifically, the Minister of Environment not only offered to support a request for feasibility study money to USAID, she also suggested that her staff work with the coffee growers' association (APROHCAFE) to fund our study for the town of Concepción de María. Furthermore, she organized our visits with the national electric utility (ENEE), as she is the President of the Board of Directors. Carbon credits is an issue being discussed in Honduras, and she found the IIP's use of renewable energy interesting. She expressed support of the IIP concept and offered to send a letter stating so to the Minister of the social investment fund (FHIS). The Minister of Public works did likewise, and suggested several target communities, which we might consider. He also suggested he might be able to facilitate infrastructure to a target community. Finally, the Minister of the Social Investment Fund enthusiastically supported the IIP concept. A 20-year

veteran of IDB, she agreed with the need to pull private sector investment into the infrastructure development process if Honduras was to meet the demands of its people. She offered technical support and training, facilitation of necessary permits and to forward a request to USAID and other donors for the cost of a feasibility study.

Visits included meetings with several influential development NGOs, investor groups and "captains of industry." Universally, the IIP concept was well received, with many expressing their interest in participating as investors once a detailed feasibility study was completed.

Meetings also included several bankers. Most important of these was with Mario Reina, Country Representative for the Central American Bank for Economic Integration (BCIE) and eight members of his technical team, who expressed keen interest in the IIP concept and offered to work with any group of investors interested in developing a project. He went so far as to offer preferential rates with attractive grace periods of up to one year.

Meetings with the Executive Director of ENEE, the national electrical utility yielded support of the concept and an offer to provide the distribution network wherever we installed an IIP. Furthermore, he offered a list of sites not currently served by the national grid, and not likely to receive service within the near future. One such community is Santa Cecilia de Copan, which has a population of approximately 18,000 and is separated from the grid by 29 Km of incredibly rugged terrain – an ideal site for an IIP. He also mentioned Trójes, on the Nicaraguan border and Brus Laguna and Puerto Lempira in the Mosquitia. One aspect of IIP development he felt was critical is the renewable energy component. As Honduras pushes for energy independence, a main thrust is to capitalize on the nation's enormous hydro potential while avoiding the pitfalls of mega-projects. They are receiving a great deal of support from international donors to explore the most probable renewable energy sources such as micro-hydro, wind and geothermal. Their investigation of solar sources has been limited to school-top panels for classroom illumination, he said. He mentioned a 60 MW wind project being studied by Enron and a 35-40 MW biomass project being developed by BioGen/Sempra. Both, however, are still in the conceptual stages.

Finally, we conducted a site visit to the town of Cantaranas, which has a population of approximately 3,500 in the urban center with another 7,000 in surrounding neighborhoods. Cantaranas (San Juan de Flores) was promoted by the Minister of Public Works as having a) need, b) a dynamic Mayor, c) a major industrial client and co-investor, and d) the ability to serve as an ideal model project due to its proximity to Tegucigalpa, the capital. The final result of these meetings is a clear timetable to executing a full-blown feasibility study, and subsequent development of an IIP. Michaela Brehm, an economic development specialist assigned to Cantaranas by the Peace Corps, is developing a small-business incubator that will enhance economic development associated with the IIP.

The telecommunications component of the Honduran IIP is weak, given the nature of the cellular development market in Honduras and the national phone company's (HONDUTEL) progress towards rural service delivery. However, CELTEL, holder of the monopolistic cellular license for Honduras has chosen Cantaranas as the site of a new microwave tower scheduled to be built next year. While not likely, CELTEL's participation in the IIP on the telecom side is not completely out of the question.

Other promising leads in Honduras include APROCAFE, the Honduran Coffee Producers' Association. They have a fund of approximately \$90,000 USD for conducting energy feasibility studies to stimulate economic growth in the coffee regions through value-added industries. The Minister of Environment was especially interested in the possibility of TVIG conducting a feasibility study for them resulting in a hybrid hydro-diesel solution.

Similarly, the Executive Director of ENEE, the national electric utility offered several suggestions. Firstly

he offered to provide TVIG/Comercial Laeisz a list of communities which are off the grid, meet the socio-economic requirements of an ideal target for TVIG's IIP, and are not included in current plans for grid expansion. . He emphasized that IIPs are legal and PPAs are possible as long as the cost is at or less than \$.06/kWh.

Feasibility study money is still an issue in both Honduras and Nicaragua. The Minister of the Honduran Social Investment Fund (FHIS) is willing to go to USAID with a request for funding for the study. The Ministers of Environment and Public works will write supporting letters, along with the Mayor of Cantaranas to support this request. In addition to acting as the conduit for the funding of the feasibility study, FHIS has offered to support an IIP through training, and complementary projects such as a health clinic and a market facility.

One final option is the Roatan Electric Company (RECO). It is the only fully privatized, independently owned and operated generation, transmission and distribution system in the country. The Bay Islands (Roatán, Utila and Guanaja) currently suffer irregular service and a generation deficit. Furthermore, the growth in both permanent population and tourism has resulted in an potable water shortage. Meetings with RECO are being scheduled in Tampa.

Nicaragua

Meetings included the Executive Director of the National Energy Commission (CNE), banking institutions, equipment dealers and commercial partners.

The meeting with Luis Velásquez, the Executive Director of the National Energy Commission (CNE) and former marketing manager for Conoco Oil in California, was very productive. It is clear that the IIP concept fits perfectly into the national strategy for electrification. Their primary goal is to increase the percentage of the population with access to electricity from 48% to 65% within the next two years (campaign promise). Nicaragua will suffer a 400 MW deficit over the next four years and growth in demand is expected to exceed eight percent per year. While the country is well down the road to privatizing both generation and distribution, much work is yet to be completed. IDB, World Bank and several other sources have donated a total of \$12 Million USD to develop a national master plan for electrification and to execute up to three pilot generation/distribution projects. According to CNE and the newly passed law 272, those who generate power will be excluded from the distribution concessions and vice versa. However, an IIP will be permitted to both generate and distribute to local markets. All materials used in the generation and distribution may be imported tax free, and revenues are tax-free until one year after the IIP is profitable. Fuel may be purchased tax-free for generation, and certain government subsidies are available for IIPs in specific target regions of the nation such as the Atlantic Coast (Mosquitia). Government loans are available at 1.2% interest for geothermal activities. Velásquez assured that all permits necessary for the IIP would be relatively simple to obtain, and that he would guarantee a transparent process.

According to the banking sector meetings, preferential financing is available in both local currency and US dollars. Furthermore, there is a one to two year grace period for municipal infrastructure. Roger Arteaga, the Country Representative for the Central American Bank for Economic Integration was extremely enthusiastic and is working to draw in other potential investors. Furthermore, he is looking for non-reimbursable funds for the feasibility study, while at the same time offering feasibility study resources as part of a loan package. Mr. Arteaga vehemently offered to coordinate key meetings for the next visit.

Finally, the Nicaragua Machinery Company (NIMAC) expressed interest in becoming a commercial partner. They felt the idea was viable, but was not an element in their core business model. However, following our conversation, they felt that it could fall within their activities, not only as a possibility for equipment sales and maintenance, but as a new OEM product.

In short, Nicaragua is not as well developed as a potential site as Honduras. While the potential is enormous (perhaps much larger than Honduras) it will take several more visits to a) identify a solid commercial partner, and b) consolidate government support.

Conclusions

This trip has set the stage for developing a functional IIP in Honduras. Next phase is to find funding for the feasibility study (\$50,000 to \$120,000 USD depending upon the number of target communities) either externally or internally. The ingredients are in place for a strong Honduran consortium of investors, include several willing to make both cash and in-kind contributions to the feasibility study process. To this end, TVIG and Comercial Laiesz developed a detailed list of action items.

Nicaragua shows great potential. However, further development of a strong commercial partner is critical. Without such partner, TVIG would be forced to field an in-country representative to develop the project. This course of action is not particularly viable given the fact that local investors must take charge of developing the project if the IIP concept is to prove viable and sustainable.

Results

Specific results from this trip include establishing key steps to making the development of an IIP in Central America a reality in the very near future. We derived expressions of support from key government officials who have at least two years before the completion of their terms. Furthermore, we identified enough potential investors to capitalize an IIP project. The only remaining obstacle to commencing work is obtaining funding for a feasibility study.

Next Steps

Immediate "next steps" are underway in Honduras. By November 15 a package of supporting letters will be delivered to the Minister of FHIS. By November 20, the Minister of FHIS will have presented the letters requesting support of the feasibility study to various sources, including USAID. By December 2 we should have a response from the funding sources. By January 15 we should receive definite notice of funding for the feasibility study, with a tentative start date of February 1 and a completion date of March 1, 2000. A minimum of two additional TVIG trips to Honduras will be necessary to move the process along. In the mean time, Comercial Laiesz is securing a firm market for the water produced by the IIP and assigning a full-time staff member to gather economic data for pre-feasibility study activity.

Nicaragua will require at least two more visits to reach the level of development of Honduras. Subsequent visits will include meetings with those listed below.

Meeting Summary

Honduras

Bernardo Hirsch, President, Comercial Laiesz
Alexander Pagels, Vice-President, Comercial Laiesz
Lombardo Rubí, Engineer
Irving Zavala, Regional Manager

Humberto Montoya, Honduran Ambassador to Nicaragua

Ramon Cardona, Employment Generation, FHIS

Ramón Medina Luna, General Manager, CELTEL Honduras

Dr. Carlos Varela, Mayor, Cantaranas

Dr. Iliana Waleska Pastor, Minister of Social Investment Fund (FHIS)

Mateo Ybrín, General Manager, Tres Valles Sugar Mill

Roger Marin Neda, Presidential Investment Program

Miguel Facussé, Industrias Celsa

Mario Reina, Country Representative, Central American Bank (BCIE)

Roberto Pereira, Energy Sector Specialist, BCIE

Manuel Bórgas, Municipal Infrastructure Specialist, BCIE

Enrique Paredes, Municipal Credit Specialist, BCIE

Daniel Peters, Economic Officer, US Embassy

Minister of Transport, Public Works and Roads

Antonio Young, FIDE

Xiomara Gomez de Caballero, Ministry of Environment, President, Board of Directors of ENEE

José Manuel Arriaga Yacamán, Executive Director of ENEE (Honduran Electric Utility)

Nicaragua

Luis Velásquez, Executive Director, National Energy Comission (CNE)

Roger Arteaga, Country Representative, Central American Bank

Sergio Hüeck, Caterpillar Division Manager, NIMAC

Orlando Herrera, Sales Manager/Industrial Division, NIMAC

Herty Lewites, President Hertylandia (Investor, Hotelier, Former Minister of Toursim)

Roger González, President, Oxford Institute (Possible TVIG Representative)

Meetings for Subsequent Visits

Honduras

Gerrardo Zepeda Bermudes, Minister, Honduran National Science and Technology Comission

Oscar Andino, President, Lucent Technologies, Honduras
Mario Randón, VP, Lucent Technologies, Honduras

Gary Ward, US Department of Energy (Involved with Honduras)

Jeremy Martin, US Trade Development Agency (Assigned to Honduras)

Louis McLaughlin, President, Roatán Electric Company (RECO)
Alan Hyde, President Board of Directors, Roatán Electric Company (RECO)

Nicaragua

Carlos Noguera, Director, Fondo de Inversion Social de Emergencia

Elgar Quintana, Executive Director, Empresa Nicaraguense de Electricidad

Roberto Duárte, Director, Rural Electrification Programs, ENEL

José Ríssio, Executive Director, Instituto Nacional de Fomento (INIFOM)

Armando Castillo, President, American Chamber of Commerce

Gabriel Pasos, Camara de Industrias

Salvador Quntanilla, Unidad de Reestructuracion de ENEL (URE)

Mike Mannon, NRECA (EL Salvador)

Edwin Zabala, President, Fundacion Augusto Cesar Sandino

Carlos Zacasa, Minister, Ministerio de Fomento de Industria y Comercio

Ricardo Gómez, IDB Counterpart, MIFIC

Robert Terán, President, Consejo de Empresas Privadas (COSEP)

H

**INTERNATIONAL POWER INSTITUTE
MOREHOUSE COLLEGE**

Proposal for Training ESKOM Labor Union Leaders

**INTERNATIONAL POWER INSTITUTE
MOREHOUSE COLLEGE**

**Proposal for Training ESKOM
Labor Union Leaders**

International Power Institute * Morehouse College

Proposal for Training ESKOM Labor Union Leaders

Table of Contents

EXECUTIVE SUMMARY OF IPI PROPOSAL TO ESKOM FOR SHORT TERM TRAINING FOR ESKOM UNION LEADERS

Introduction	3
Training Program Objectives	3
Subject Material	4
Deliverables	5
Cost of Program	5
Long Term Training Program	6

MOREHOUSE COLLEGE AND OBJECTIVES OF TRAINING PROGRAMS

Brief Description of Morehouse College	7
Mission Statement	7
International Power Institute	8
ESKOM Request to Train Labor Leaders	8
Proposed Training Program Objectives and Process	8

FOUR WEEK TRAINING MODULE

Subject Material for Morehouse/IPI Training Course for ESKOM	11
Deliverables	12
Training Program Schedule	13
Week One: "Participatory Assessment"	14
Day 1 (Monday)* Introductory Session	14
Day 2 (Tuesday) Brief Overview of Current US Labor Relations & Comparison to South African Labor Relations	14
Day 3 (Wednesday) Assessment of ESKOM	16
Day 4 (Thursday) Issues of Labor Relations and Law	16
Day 5 (Friday) Developing Labor Relations Theories	17
Week Two: "Economics"	18
Day 1 (Monday): Economic Overview	18
Day 2 (Tuesday): Energy Basics/Electric Utility Operation	18
Day 3 (Wednesday): Competition and Globalization	19
Day 4 (Thursday): Restructuring and Privatization	19
Day 4 (Thursday) Management Orientation (Management Only)	20
Day 5 (Friday): Management Preparation for Joint Session (Management Only)	20
Day 5 (Friday) Joint Assessment Union/Management of Needs & Issues	21
Week Three: Democratic Unionism and Workplace Diversification	22
Day 1 (Monday): Democracy Unionism	22
Day 2 (Tuesday): Union Approach to Workplace Education and Training	22
Day 3 (Wednesday): Comparative International Study of Labor Relations	23
Day 4 (Thursday): Case Studies on High Performance Work Organization and Human Resource Management (Mutual Gains)	23
Day 5 (Friday): Shared Experiences with different approaches to Collective Bargaining—Organizing Models, Continuous Bargaining, Mutual Gains	24
Week Four "Leadership"	25

Day 1 (Monday): Defining Leadership and Women As Union Leaders	25
Day 2 (Tuesday): Identification of Critical Labor Relations Issues With ESKOM	25
Day 3 (Wednesday): Plans for Change and Process of Leadership Development	26
Day 4 (Thursday): Effective Ways To Present Issues/Context for Negotiations/Discussions with ESKOM Management	26
Day 4 (Thursday): Management Preparation for Joint Session (Management Only)	27
Day 5 (Friday): Review of Major Lessons Learned from the Four Week Training/Evaluation/Graduation Certificates	27
LABOR RELATIONS TEAM FOR SHORT TERM PROGRAM	28
The Labor Relations Team	28
Core Team:	28
Dennis Orton: (Team Leader) (Morehouse)	28
Lee Schore: (Center for Working Life)	29
Ashaki M. Binta: (Morehouse)	29
Peter Donahue: (PBI, Associates)	30
Instructors/Consultants:	31
Hasan Crockett: (Morehouse)	31
Steven Deutsch: (University of Oregon)	31
Thandabantu Iverson: (Indiana University Northwest)	32
Rene H. Males (Strategic Decision, Inc., IPI Board Member)	33
Landis Martilla: (IBEW)	34
Resource People:	34
Robert Baugh: (AFL-CIO)	34
Dan Holub: (IBEW)	35
Roberta Till-Retz: (University of Iowa)	35
Morehouse College/IPI	35
EXHIBIT B Short Term Training Labor Relations Team Responsibilities	36
Short Term Training Program (Four Week) Budget*	37
THREE MONTH TRAINING MODULE	39
Long Term Training Program	39
Month One: Main Theme – Democratic Unionism	39
Week One: Collective Bargaining Training Seminar	39
Week Two: Grievance Handling and Arbitration Resolution	40
Week Three: Identified Site Visits in South Africa	40
Week Four: Union Organizational Structure, Administration, and Governance	41
Month Two: Main Theme—Leadership Development	41
Week One: Overview	41
Week Two: Meeting Organizational and Political Challenges	41
Week Three: Work-site Visits/Round-table Discussions	41
Week Four: Workforce Diversity and Women as Union Leaders	42
Month Three: Main Theme—Economics	42
Week One: “Popular Economics Course for Workers and Union Leaders” (LERC)	42
Week Two: “Unions and Economic Competitiveness”	43
Week Four: Globalization and Comparative Political Economy of Industrial Relations	43
Projected Daily Classroom Schedule for the Three-Month training program	44
LABOR RELATIONS TEAM FOR LONG TERM PROGRAM	45
Exhibit C Long Term Training Labor Relations Team Responsibilities	46
Long Term Training Program (Three Month) Budget*	47

EXCE
SUMMARY

Executive Summary Of IPI Proposal To ESKOM For Short Term Training For ESKOM Union Leaders

Introduction

The International Power Institute (IPI) at Morehouse College is pleased to respond to ESKOM's request transmitted on 2 June 1998. In the response that follows, IPI has organized an exceptional team to design and create a Short Term Training Program for ESKOM Union Leaders which will last four weeks and take place at a location in South Africa to be designated by ESKOM. Our recommendation, to contain costs, is to hold this training at the ESKOM Training Center.

This proposal envisions a group of no more than 25 union leaders to be trained at the same time but the program could be expanded to accommodate up to 40 trainees. The program is designed around interactive training with lectures followed by discussion, case studies, trainee work groups, homework assignments and two field study visits. Also, the program is designed to have a number of ESKOM management people join the course for one day in the second week and one day at the end, in each case after a half day of preparation in separate sessions from the union leaders, to share with the trainees expectations and, at the end of the program, their course experiences.

In addition, IPI has prepared a follow on proposal for a Long Term Training Program. This LT program is specified in less detail but can be expanded based on future discussions with ESKOM management.

Training Program Objectives

The training program is designed with the following objectives:

1. Determine and identify the most pressing problems facing ESKOM Union Leadership in their relationship with management;
2. Instill in the union leadership a heightened sense of purpose and willingness to take ownership of a process that will increase effective outcomes of meaningful, good faith bargaining;
3. Develop skills and experience leading to improved union administration;
4. Enhance realistic expectations and improve process knowledge to facilitate future labor negotiations and grievance proceedings;
5. Provide participants with enhanced skills and knowledge to develop and/or strengthen a functioning, democratic work culture and structure internal to the union.

Subject Material

The course content will span topics from basic instruction in such as economics and utility operations to more complex issues such as evolving labor relations theories and practices and global movement toward privatization of electric utility operations. Listed below are the principal topic headings contained in the course:

- US/South African Labor Relations Trends
- Union/Trainee/ESKOM Expectations
- Economics
 - Basic Principles
 - Macro Theory
 - Micro Theory
- Energy
 - Introduction to Basic Principles
 - Utility Operations
 - Competition & Globalization
 - Restructuring & Privatization
- Labor Relations
 - Current & Developing Labor Theories
 - Workforce Diversity
 - Comparative Study
 - High Performance Work Forces
 - Mutual Gains Bargaining
- Critical Issues
 - Union Function/Responsibilities
 - Union Democracy
 - Workplace Education
 - Literacy Issues & Skill Enhancements
 - Worker Displacement & Manpower Management
 - Process Change in the Workplace
 - Comparative Study
 - Defining Leadership
 - Leadership Development
 - Women in Unions & as Leaders
- Site Visits

Exhibit A shows the layout of the proposed four weeks of sessions. In the Section of the Proposal “Four Week Training Program”, there is a more detailed outline of activities for each day.

It should be particularly noted that the proposal includes having a select management team join the training group on two days. The first time is toward the beginning of the sessions to learn what the trainees identify as their needs and concerns. Also, it gives management an opportunity to voice their opinion on issues that the program should cover. There is scheduled a half day prior to this joint session for the management people to learn about what is proposed to be covered in the course and to voice their opinions to the staff on issues as the management perceives them. Finally, on the last day of the sessions, the management group will be asked to join in the session with the trainees to learn what has been accomplished and to hear the Union people's concerns and issues.

Deliverables

IPI will be responsible for a number of deliverables in addition to putting on the training program. These include the following:

- Curriculum Development — A detailed outline for each training session will be developed by the IPI staff for use by the trainers and to assure full coverage of the subject matter detailed in the course outline.
- Training Manuals — The IPI staff will produce a training manual for each course participant. The manuals will be divided by subject matter and will contain the following materials:

worksheets	daily work	small group projects	demonstrations
special projects	homework	glossaries	library references
graphs	charts	quizzes	

- Computer Self-test — These automated tests will be available for trainees to evaluate their progress.
- Evaluation Devices — These evaluation devices will include:

daily work	homework assignments	test/quizzes
reassessment tests		

At the end of the training program, IPI will perform the following functions:

- Hold a debriefing of training instructors;
- Conduct an audit of expenditures;
- Prepare a final report on the training project including evaluations, summaries of achievements and recommendations. A copy will be submitted to ESKOM.

Cost of Program

In designing the program, it is assumed that ESKOM will furnish the facility in South Africa where these training sessions will be held. Also, it is assumed the ESKOM will provide food and

other incidental expenses during the sessions and transportation as needed for the operation of the training sessions. These items are not included in the budgeted expenses below.

For the remaining expenses —including preparing all materials for the training sessions, training the trainers, transporting the trainers to South Africa and back and paying the trainers expenses— IPI requests payment of \$ 285,000. A detail of this budget appears in the section “Short Term Training Program—Budget.”

Long Term Training Program

Also included in the material is an outline of a follow-on course proposal termed the “Long Term Training Program.” This would provide selected union people with an intensive course lasting 3 months and include training both in South Africa and in the U.S. If ESKOM would like a more detailed proposal, IPI would be pleased to develop such a proposal after it has had a chance to discuss the elements of the program with ESKOM management and union leaders.

IPI proposes a budget of \$620,000 but is subject to revision when the details of the proposed training program are further discussed. A detail of this budget appears in the section “Long Term Training Program—Budget.”

MOREHOUSE/IPI

Morehouse College and Objectives of Training Programs

Brief Description of Morehouse College

Morehouse College is an independent four-year fully accredited historically black liberal arts college for about 3,000 men, with a faculty of some 170 full-time professors, located a mile west of downtown Atlanta, Georgia, the cultural and economic center of the South. Dotted with a mixture of old and an increasing number of new buildings, the 55-acre campus forms part of the Atlanta University Center (AUC), the largest private educational complex with a predominantly African-American enrollment in the world.

Since its establishment in 1867, Morehouse has been providing young men with the educational and inspirational experiences that have built leaders for the U.S. and world society. Morehouse is committed to the continuation of this tradition. As the nation's only historically black all-male college and in recognition and appreciation of its origin, Morehouse assumes a special responsibility for teaching students about the history and culture of black people. The College seeks to develop leaders who will be qualified and committed to solving the problems of society with special attention given to those of African-Americans. Inspired by the legacy of distinguished alumni, presidents, and professors—persons who have wrought significant social changes—the College supports and encourages programs which benefit all people and which seek to eradicate discrimination and injustice.

As a private four-year residential liberal arts college, Morehouse provides an educational program in the arts and humanities, the natural sciences and mathematics, and the social sciences and business. Morehouse is firmly committed to attracting and enrolling students of high caliber from a wide variety of educational and economic backgrounds and providing them with learning and leadership development opportunities. In preparing students for admission to graduate or professional school or for immediate entrance into professional careers, the College teaches students to think clearly and critically, to make logical and ethical judgments and to communicate effectively with others. In addition, Morehouse instills in students a commitment to service. Morehouse emphasizes the continuing search for truth as a liberating force and subscribes to the philosophy that in order to be educated, men must learn about themselves and about their world in all its varied aspects. Thus, the Morehouse student is both challenged and prepared to influence his world positively.

Mission Statement

“...In recognition and appreciation of its origin, Morehouse seeks to develop leaders who will be qualified and committed to solving the problems of society with special attention being given to those of African-Americans. The College supports and encourages programs which benefit all people and which seek to eradicate discrimination and injustice... In addition, Morehouse instills in students a commitment to service. Morehouse also emphasizes the continuing search for truth as a liberating force and subscribes to the philosophy that in order to be educated, men must learn about themselves and about their world in all its varied aspects.”

International Power Institute

In 1997, Morehouse College established the International Power Institute (IPI) as a part of the newly established Andrew Young Center for International Affairs. The Department of Energy has assisted IPI by providing a grant to help it carry out its goals of: 1) facilitating electric power and related infrastructure transaction between developing countries and the U.S. power sector; 2) collaborating with developing countries to identify development strategies to achieve energy stability and enhance economic development; and 3) encouraging market driven energy solutions and 4) working collaboratively with other international trade, energy, technology and banking organizations. IPI has concentrated its initial efforts in the South African and Mexican power sectors. As a part of this initial effort, IPI undertook an exploratory visit to South Africa in March 1998 to gain a better understanding of the current economic and political involvement in South Africa, obtain a picture of the energy situation and to evaluate potential opportunities or future IPI projects.

ESKOM Request to Train Labor Leaders

As a result of the exploratory visit, ESKOM expressed an interest in getting IPI's assistance in helping to train its labor leaders. In June 1998, ESKOM followed up this initial contact with a letter requesting IPI to develop a proposal to provide a proposal for both short term (3 to 4 weeks) and long term training (2-3 months) in the areas of economics, democratic unionism and leadership. This proposal is in response to this request.

Proposed Training Program Objectives and Process

The training program is tailored to meet ESKOM's needs and designed specifically to enable ESKOM management and its unionized workforce to:

- a) accurately understand and analyze the nature of their past and current working relationship, as well as envisioned changes regarding the way work is organized and structured;
- b) provide the knowledge and skills to be able to work and negotiate in a structured manner to reach agreements to improve their "respective" labor relations.

In order to provide this training Morehouse College's IPI has elected the support of its Brisbane Institute to engage faculty and other experts in labor education, labor leadership skills development and organizing skills to help to conduct the training programs. The training programs will utilize the following processes:

- a) **Participatory Assessment:** This approach places a premium on the initial validation of the experiences and values of the participants, in addition to honest feedback on their expectations and solicitation of their reasons for involvement. Reaching out with integrity and respect and earning trust are important to the process.
- b) **"Do-It-Yourself" (DIY) Preparation and Planning:** This aspect of the program encourages, whenever possible, participants doing research, leading discussions, role-playing

demonstrations and problems solving for themselves. DIY is vital for participants becoming competent and confident enough to look and progress beyond their current roles.

- c) **Structured Leadership Challenges through All Stages:** The orientation here is to challenge all participants, as leaders, to take ownership of the training effectiveness and outcomes. This requires their active role in shaping the training programs' issues and questions, as well as the development of the curriculum, materials, and methods. This variant and orientation goes beyond the typical "train-the-trainer" methodology.
- d) **“Understand If Not Walk In the Other Parties Shoes”:** Participants are invited to come to grips with the content and culture of the views of "the other side." This will lend to an assessment for both sides, of the operational and functional environment of the other party or parties with whom they are obliged to work, live and negotiate. The goal is the creation of an environment and process of basic, honest exchange.
- e) **Methodology:** Our training orientation is guided by and rooted in the belief that "*showing is better than telling, and doing is better than showing.*" Sessions will include guest speakers, trainee projects, library research and field trips.

ST TRAINING
PROGRAM

Short Term Training Program for ESKOM Union Leaders

Four Week Training Module

I.P.I.'s Labor Relation's Team has put together a Four (4) Week Training Module, broken down into four, one week segments. The subject content has been developed by the team based upon the request from ESKOM and the expertise of the Core Team members and their advisors and consultants.

The training process is designed to:

1. Determine and identify the most pressing problems facing ESKOM Union Leadership in their relationship with management;
2. Instill in the union leadership a heightened sense of purpose and willingness to take ownership of a process that will increase effective outcomes of meaningful, good faith bargaining;
3. Develop skills and experience leading to improved union administration;
4. Enhance realistic expectations and improve process knowledge to facilitate future labor regulations and grievance procedures;
5. Provide participants with enhanced skills and knowledge to develop and/or strengthen a functioning democratic work culture and structure internal to the union.

The time and specific location for this training in South Africa is to be determined by mutual agreement between ESKOM and IPI.

Subject Material for Morehouse/IPI Training Course for ESKOM

- **US/South Africa Labor Relations Trends**
- **Union/Trainee/ESKOM Expectations**
- **Labor Needs & Issues at ESKOM**
- **Economics**
 - Basic Principles
 - Macro Theory
 - Micro Theory
- **Energy**
 - Introduction to Basic Principles
 - Utility Operations
 - Competition & Globalization
 - Restructuring & Privatization

- **Labor Relations**
 - Current & Developing Labor Theories
 - Work Force Diversity
 - Comparative Study
 - High Performance Work Forces
 - Mutual Gains Bargaining
 - Critical Issues
- **Union**
 - Union Democracy
 - Workplace Education
 - Literacy Issues & Skill Enhancement
 - Worker Displacement & Manpower Management
 - Process of Change in the Workplace
 - Comparative Study
 - Defining Leadership
 - Leadership Development
 - Women in Unions & as Leaders
 - Site Visits

Deliverables

Curriculum Development—IPI's staff will be responsible for developing the curriculum for the ESKOM Union Leadership Training Program. The subject matters for the four-week training module are as follows: Economics, Democratic Unionism, Leadership Development/Training, Labor Relations, Electric Utility Operations, Energy Basics, Competition/Globalization, Privatization, Workforce Diversity Training, Workplace Education, Collective Bargaining. (See current module outline for details.)

Training Manuals—IPI's staff will be responsible for producing training manuals for all participants. The training manuals will be divided by subject matter: Each subject matter section will contain the following materials:

worksheets	daily work	small group projects	demonstrations
special projects	homework	glossaries	library references
graphs	charts	quizzes	

Instructors' Manuals—IPI staff will be responsible for producing instructor's training manuals. Each subject matter section will contain the following materials.

daily work	workbooks	instructor observations
test/quizzes	reassessment test	practice sheets
pupil progression indicator	special projects	workbook checkers

Computer Self-test—IPI will be responsible for designing a computer self-test for the Union Leadership Training Program.

Evaluation Devices—IPI staff will be responsible for developing evaluation tools for the ESKOM Union Leader Training Program according to subject matter. The evaluation tools consist of:

daily work	homework assignments	test/quizzes
reassessment tests		

Materials Production—IPI will be responsible for producing all materials related to the ESKOM Union Leader Training Program.

Training Program Schedule

The Short Term Program for ESKOM Labor Leaders is broken down into four, one-week modules for the union leaders.

All training will encourage 'Do-It-Yourself' (DIY) format with participants doing research, leading discussions, role-playing and problem solving. Course training will also involve case studies, practicals, self-study, and some homework and a few specified lectures.

Week One: “Participatory Assessment”

Day 1 (Monday)* Introductory Session

08:00 — 08:30	Breakfast
08:30 – 10:15	Introductions; Discussion: Why are they here? — Why are we meeting?; Their understanding of the meeting process and purpose of training
10:15 – 10:30	Break
10:30 – 12:00	How they see benefiting from the training program. Role they see for themselves. Role they expect of us
12:00 – 1:00	Lunch
1:00 – 3:00	Brief summary presentations of topics and issues in course training, including U.S. labor relations
3:00 – 3:15	Break
3:15 – 4:45	Solicit feedback, clarification questions on course topics; Critiques, any suggestions regarding how to make issues more relevant, any suggested additions, ordering of priorities
4:45 – 5:00	Homework assigned
5:00 – 6:30	Free / Personal Time
6:30 – 7:30	Dinner*

* Note: Each evening there will be a hospitality room established for students to interact and exchange ideas on what they have learned. Faculty will be available to answer questions or interact with trainees.

Day 2 (Tuesday) Brief Overview of Current US Labor Relations & Comparison to South African Labor Relations

08:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework Assignment
10:15 – 10:30	Break
10:30 – 12:00	Overview of U.S. Labor Relations
12:00 – 1:00	Lunch

1:00 – 3:00	South African Labor Relations: Solicit assessment of co-workers, demographic issues, factors which contribute to harmony, disharmony, and tensions
3:00 – 3:15	Break
3:15 – 4:45	Assessment of the union: expectations, vision, reality, strengths, weaknesses, clarification of roles in general and at ESKOM
4:45 – 5:00	Homework Assigned
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Day 3 (Wednesday) Assessment of ESKOM

0:800 – 08:30	Breakfast
08:30 – 10:15	Review Homework Assignment
10:00 – 10:15	Break
10:15 – 10:30	Assessment of ESKOM as an Employer
12:00 – 1:00	Lunch
1:00 – 3:00	Assessment of ESKOM's Economic and Social Development Responsibilities
3:00 – 3:15	Break
3:15 – 4:45	Assessment of South Africa's government, principal political forces, S.A.'s role in the region, internationally; their role as citizens, taxpayers, consumers, etc.
4:45 – 5:00	Homework Assignment
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Day 4 (Thursday) Issues of Labor Relations and Law

08:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework
10:15 – 10:30	Break
10:30 – 12:00	Issues of Labor Relations: Comparison US/SA

12:00 – 1:00	Lunch
1:00 – 3:00	Issues of Labor Law: Comparison US/SA
3:00 – 3:15	Break
3:15 – 4:45	Discussion of Effect of Labor Relations, Traditions and Labor Law on ESKOM
4:45 – 5:00	Homework assigned
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Day 5 (Friday) Developing Labor RelationsTheories

08:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework Assignment
10:15 – 10:30	Break
10:30 – 12:00	Current and Developing Labor Relations: distinctions between Taylorism (scientific management), lean production and high performance work organization; What constitutes “traditional” adversarial trade unionism and adversarial labor relations in the U.S.
12:00 – 1:00	Lunch
1:00 – 3:00	Evolution of Human Resource Management Current Trends in the Organized Labor Movement, including: Employee Involvement, Quality of Work Life, Total Quality Management, New Work Systems, Mutual Gains as a process, Socio-Tech Reengineering, Virtual Organization.
3:00 – 3:15	Break
3:15 – 4:45	Sum-up Main Lessons Learned for the Week
4:45 – 5:00	Homework Assigned
5:00 –	Free for Weekend

Note: This detailed focus on participants sharing views on the range of issues and various relations is key for the Core Team to shape the training program to address their needs. Also intended is the establishment of trust and mutual understanding, if not agreement of how best to work together and maintain integrity to the process. In addition, for the first week, assessment and acknowledgement of South Africa's situation, including the status of all parties involved, can identify “workplace improvement opportunities, growth and development” for union leaders and for ESKOM.

Week Two: "Economics"

Day 1 (Monday): Economic Overview

08:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework
10:15 – 10:30	Break
10:30 – 12:00	Introduction to Economic Overview/"Common Sense Economics", AFL-CIO Education Program
12:00 – 1:00	Lunch
1:00 — 3:00	Basic Macro Economics: GNP, Saving and Investing, Passive Consumption, Active Investment, Budgets and Fiscal Policy, What Money Is, How It Works, Inflation, Productivity
3:00 – 3:15	Break
3:15 – 4:45	Basic Micro Economics: Supply and demand, prices, strengths and weakness of markets
4:45– 5:00	Homework Assigned
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Note: The team will make use of relevant practical exercises, case-studies, visual aides with charts, graphs, overhead) and role plays to effectively present subject material, in keeping with DIY pedagogy.

Day 2 (Tuesday): Energy Basics/Electric Utility Operation

08:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework
10:15 – 10:30	Break
10:30 – 12:00	Energy Basic Principles: Energy Markets, Competition Among Energy Sources, End-use Markets, Efficiency and Conservation, Energy Driver of Economy.
12:00 – 1:00	Lunch

1:00 — 3:00	Electric Utility Operation: Generation/Transmission/ Distribution, Finance, Role of customers, Development of Non-utility Sources, and Competition.
3:00 — 3:15	Break
3:15 — 4:45	Comparative Case Studies
4:45 — 5:00	Homework Assigned
5:00 — 6:30	Personal Time
6:30 — 7:30	Dinner (access to hospitality room after)

Day 3 (Wednesday): Competition and Globalization

08:00 — 08:30	Breakfast
08:30 — 10:15	Review Homework Assigned
10:15 — 10:30	Break
10:30 — 12:00	Defining Competition: Challenges to Domestic Economic Development, Case Study
12:00 — 1:00	Lunch
1:00 — 3:00	Defining Globalization: Practical exercises, Topical Issues, Local Ramifications; Case Study, Group Breakout
3:00 — 3:15	Break
3:15 — 4:45	Discussion of Case Findings: Challenges to South Africa, South African Workers, ESKOM
4:45 — 5:00	Homework Assigned
5:00 — 6:30	Personal Time
6:30 — 7:30	Dinner (access to hospitality room after)

Day 4 (Thursday): Restructuring and Privatization

08:00 — 08:30	Breakfast
08:30 — 10:15	Homework Review
10:15 — 10:30	Break

10:30 – 12:00	Definition of Restructuring: Trends in industrial organizations, Mergers, Out sourcing, Vertical/horizontal integration/dis-integration, Public Sector/context for Privatization
12:00 – 1:00	Lunch
1:00 — 3:00	Privatization Trends: Historical trends in all industries, Comparative developments in utility industry, Challenges, Problems, Case-studies
3:00 – 3:15	Break
3:15 – 4:45	Implications for South Africa, ESKOM, Union Leaders, Workforce.
4:45 – 5:30	Homework Assigned: Preparation for Joint Meeting
5:30 – 6:30	Personal Time
6:30 – 7:30	*Dinner (access to hospitality room after)

Day 4 (Thursday) Management Orientation (Management Only)

1:30 – 2:15	Purpose of Training Program for ESKOM Union Leaders
2:15 – 3:00	Material Covered in Program
3:00 – 3:15	Break
3:15 – 4:00	Material to be Covered in Program
4:00 – 5:00	Management Perception of Needs & Issues
5:00 – 5:30	Homework Assigned
5:30 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

*Join Union Leader Trainees for Dinner

Day 5 (Friday): Management Preparation for Joint Session (Management Only)

08:00 – 08:30	*Breakfast
08:30 – 9:30	Review Homework Assignment & Preparation for Joint Session

09:30 & Beyond *(See joint schedule)

(Note: Asterisk (*) on topic denotes joint session

Day 5 (Friday) Joint Assessment Union/Management of Needs & Issues

08:00 – 08:30	Breakfast
08:30 – 9:30	Review Homework Assignment
9:30 – 10:15	*Introduction of ESKOM Union/Management
10:15 – 10:30	*Break
10:30 – 12:00	*Joint Review of Expectations
12:00 – 1:00	*Lunch
1:00 – 3:00	*ESKOM Issues and Needs
3:00 – 3:15	*Break
3:15 – 4:45	*ESKOM Issues and Needs Continued (wrap up)
4:45 – 5:00	Homework Assignment
5:00 –	Free for Weekend

*Management participants will attend this session

Week Three: Democratic Unionism and Workplace Diversification

Day 1 (Monday): Democracy Unionism

8:00 – 08:30	Breakfast
08:30 – 10:15	Homework Reviewed
10:15 – 10:30	Break
10:30 – 12:00	Union Democracy: Social implications, Responsibilities, Impacts on operations
12:00 – 1:00	Lunch
1:00 — 3:00	Challenges of Diversification: Workplace social regional/provincial, national implications
3:00 – 3:15	Break
3:15 – 4:45	Challenges of Diversification Continued
4:45 – 5:00	Homework Assigned
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Day 2 (Tuesday): Union Approach to Workplace Education and Training

08:00 – 08:30	Breakfast
08:30 – 10:15	Homework Review
10:15 – 10:30	Break
10:30 – 12:00	Union Approach to Workplace Education and Training
12:00 – 01:00	Lunch
01:00 – 05:00	Site Visit: Discussion with Management/Union of South African firm
5:00 – 5:15	Homework Assigned: Assess Site Visit Lessons
4:45 – 5:00	Homework Assigned
5:15 – 6:30	Personal Time

Day 3 (Wednesday): Comparative International Study of Labor Relations

08:00 – 0830	Breakfast
08:30 – 10:45	Review Homework: Site Visit Assessments
10:15 – 10:30	Break
10:30 – 12:00	Overview Labor Relations in Various Countries and Industries
12:00 – 01:00	Lunch
1:00 – 3:00	Comparative Study: Case Studies
3:00 – 3:15	Break
3:15 – 4:45	Comparative Study Wrap-up
4:45 – 5:00	Homework Assigned
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Day 4 (Thursday): Case Studies on High Performance Work Organization and Human Resource Management (Mutual Gains)

08:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework
10:15 – 10:30	Break
10:30 – 12:00	High Performance Work Organizations: Examination of Nummi, Saturn, CAMI, Shell-Sarnia, European examples
12:00 – 1:00	Lunch
1:00 – 3:00	Case Study Findings Examined Through Break Out Groups
3:00 – 3:15	Break
3:15 – 4:45	Break Out Groups Continued
4:45 – 5:00	Homework Assigned
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Day 5 (Friday): Shared Experiences with different approaches to Collective Bargaining—Organizing Models, Continuous Bargaining, Mutual Gains

08:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework
10:15 – 10:30	Break
10:30 – 12:00	Overview of Collective Bargaining/New Approaches
12:00 – 1:00	Lunch
1:00 – 3:00	Comparative Collective Bargaining wrap up
3:00 – 3:15	Break
3:15 – 4:45	Summary of main lessons learned during week
4:45 – 5:00	Homework assigned
5:00 –	Free for Weekend

Week Four “Leadership”

Day 1 (Monday): Defining Leadership and Women As Union Leaders

8:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework
10:15 – 10:30	Break
10:30 – 12:00	Defining Leadership: Criteria and Character
12:00 – 1:00	Lunch
1:00 — 3:00	Strengths and Weaknesses of Current Union Leadership
3:00 – 3:15	Break
3:15 – 4:45	Assess Status of Women in Union: Assess necessary steps to develop women leaders
4:45 – 5:00	Homework Assigned
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Day 2 (Tuesday): Identification of Critical Labor Relations Issues With ESKOM

8:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework
10:15 – 10:30	Break
10:30 – 12:00	Identification of Issues Regarding Labor Relations with ESKOM
12:00 – 1:00	Lunch
1:00 — 5:00	Site Visit: Discussion with Management/union of South African Firm
5:00 – 5:15	Homework Assigned: Assess site visit lessons
5:15 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Day 3 (Wednesday): Plans for Change and Process of Leadership Development

8:00 – 08:30	Breakfast
08:30 – 10:15	Homework Reviewed: Site Visit Assessments
10:15 – 10:30	Break
10:30 – 12:00	Process for Change: Discussion on Strategic Thinking
12:00 – 1:00	Lunch
1:00 — 3:00	Process for Change: Developing Vision
3:00 – 3:15	Break
3:15 – 4:45	Formulation of Issues as Proposals for Negotiations
4:45—5:00	Homework assigned: Subjects to be decided by group
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner (access to hospitality room after)

Day 4 (Thursday): Effective Ways To Present Issues/Context for Negotiations/Discussions with ESKOM Management

8:00 – 08:30	Breakfast
08:30 – 10:15	Participants will evaluate their peers presentations, conclusions, plans for next steps, examine if results met collective expectations from the previous day
10:15 – 10:30	Break
10:30 – 12:00	Workshops, Breakout Groups, Role Plays and Simulations
12:00 – 1:00	Lunch
1:00 — 3:00	Case Studies, Review of Findings
3:00 – 3:15	Break
3:15 – 5:00	Prepare for Sharing of Views with ESKOM Management
5:00 – 6:30	Personal Time
6:30 – 7:30	*Dinner (access to hospitality room after)

Day 4 (Thursday): Management Preparation for Joint Session (Management Only)

1:30 – 3:00	Review of Union Leaders Training Process
3:00 – 3:15	Break
3:00 – 5:00	Preparation for Joint Session: Expectations, Appropriate/Inappropriate Responses, Special issues
5:00 – 6:30	Personal Time
6:30 –	*Join Union Leader Trainees for Dinner

Day 5 (Friday): Review of Major Lessons Learned from the Four Week Training/Evaluation/Graduation Certificates

8:00 – 08:30	*Breakfast
08:30 – 10:15	*Major Lessons Learned from Four Week Training: Presentation by Trainees, Discussion Managed by IPI Staff
10:15 – 10:30	*Break
10:30 – 12:00	*Major Lessons Continued
12:00 – 1:00	*Lunch
1:00 – 2:30	*Evaluation of Training
2:30 – 3:30	*Graduation Ceremony: Presentation of Certificates
3:30 –	*End of Training Session

Labor Relations Team for Short Term Program

IPI has obtained a dynamic, experienced and professional team of respected educators and practitioners in the fields of New Work Systems (NWS), trade unionism, global economic trends, public utility industrial developments, labor studies education and training, leadership development, and union democracy available in the United States.

The core team will include four persons who will conduct the daily training and five instructors/consultants. The team also contains three resource people who will not participate in the daily training nor be "on-site" but who have helped with the development of the proposed program. (See Exhibit B) In addition, Morehouse College faculty and students will serve as resource people.

The Labor Relations Team

Core Team:

Dennis Orton: (Team Leader) (Morehouse)

Dennis Orton has earned a reputation as a nationally respected labor leader, educator and organizer, during the course of his 25 years serving in various capacities of leadership in seven (7) different international unions in the private and public sector. Mr. Orton has served as a twice-elected union vice-president, lead negotiator on national industry-wide contracts as well as regional sector and local supplementary agreements, coordinator of education and training programs, grievance and arbitration chairperson, and chair of executive boards, stewards councils and constitution and by-law committees.

Representing labor unions, Mr. Orton has also served as an official liaison with the African-American community, national civil rights organizations, the media and government labor market and regulatory agencies.

Mr. Orton possesses strong expertise in institutional needs assessment, strategic planning and implementation, and individual and group leadership skills training and development. He has gained broad recognition for his singular ability to effectively coordinate union and worker responses to workplace change and labor-management participation programs.

In his capacity as Vice-President of the American Federation of Grain Millers (AFGM), Mr. Orton developed a comprehensive education program for the union membership and was the major force developing and coordinating the strategic programmatic response of the workforce to the *New Work Systems (NWS)*.

Mr. Orton has been sought by leadership of unions and officials of the Department of Labor and Education to review and critique "cutting edge" theories, strategies, and programs regarding the

transformation of U.S. and world industrial relations and the field of Human Resource Management.

Mr. Orton has earned the respect of his peers as an important labor educator and organizer regarding job redesign, work-site re-engineering, the culture of workplace change, and the changes affecting traditional collective bargaining and contract administration.

In addition to his experience in labor, Mr. Orton has served as a mayoral aide, taught mathematics, and acted as a youth and gang counselor. In those capacities, he helped to establish successful inner-city drug prevention and school retention programs.

Mr. Orton graduated cum laude from the Choate School in Wallingford, Connecticut and studied for two years at Columbia University in New York City after transferring from Harvard University in Cambridge, Massachusetts.

Lee Schore:
(Center for Working Life)

Lee Schore is the director of the *Center for Working Life (CWL)* in Portland, Oregon and Adjunct Faculty at the University of Oregon Labor Education and Research Center. She is one of the United States leading labor educators and strategists dealing with the subject of workplace restructuring. Among her many consulting assignments she worked for large private sector corporations such as the Kellogg Company, for local and state governments in California and Oregon, and the U.S. Department of Labor.

CWL is a non-profit organization that provides innovative education, training and consultation services focusing on the mental health effects of work, and the loss of work, on individuals and families.

Ms. Schore has done extensive consultation and training on the effect of change in the workplace and the process of re-engineering in Joint Labor-Management settings. She has been an invited presenter at national and international conferences on workplace education, the changing nature of work, and design and implementation of dislocated worker and workplace education services.

Ms. Schore has worked in the international arena as a technical assistance expert for the U.S. Department of Labor, and is the author of several respected publications dealing with the field of workplace education training for dislocated workers and support services and stress counseling for workforces.

Lee Schore has a Masters Degree in Psychiatric Social Work from UCLA. Her B.A. is from Penn State University.

Ashaki M. Binta:
(Morehouse)

Ashaki M. Binta is one of the most innovative and respected practitioners in the field of leadership training and skills development for workers and communities. She has more than 20 years experience in organizing labor, community, electoral, and women's groups. The cutting edge workshops and programs she develops, with particular emphasis on the needs of and challenges to working class and disadvantaged poor populations, including women, are always grounded in promoting the values of social justice and progress.

Ms. Binta has served as a Senior Field Representative for various locals of the Service Employees International Union (SEIU). She has held responsibilities for coordinating shop steward and leadership development training as well as contract enforcement, grievance and arbitration handling, membership development, organizing and campaign development, and contract and plant closing negotiations.

Ms. Binta also has particular expertise in working with non-unionized workforces outside of traditional national, regional, and local labor formations including developing organizing campaigns, issue campaigns, workplace committees and membership organizations. Her work has continually focused on leadership and membership recruitment and development. She is also experienced in establishing worker's councils and industrially focused, geographically based networks, organizations, and structures among non-unionized workforces.

Ms. Binta has traveled in Africa and many other parts of the world. An inspirational speaker, Ms. Binta is a much sought after presenter at conferences and forums here in the U.S. and in the international arena. She is an authority on competition and globalization issues as they affect the southeastern United States.

Strongly results oriented, in 1983 – 84, Ms. Binta was one of the lead organizers of the victorious peoples campaign to elect Harold Washington Mayor of Chicago. In 1985, she became an Associate Editor of the renowned *Southern Exposure Magazine*. From 1986–1989, she was the lead organizer for the triumphant people's justice movement to reactivate the small, majority black town of Keysville, Georgia and to elect Emma Gresham Mayor. In 1991 – 92, Ms. Binta led a successful justice movement in Hamlet, North Carolina after 25 workers (18 women) were killed in the infamous fire and explosion at Imperial Foods Chicken processing plant. She has a Bachelor of Arts Degree from Valparaiso University in Valparaiso, Indiana.

**Peter Donahue:
(PBI, Associates)**

Peter Donahue, Ph.D. Economics is President of *PBI, Associates* in Portland, Oregon. He is one of the U.S. most sought after consulting economists, particularly in the field of energy and utilities in the United States.

Founded in 1982, *PBI* has earned an excellent reputation aiding unions, communities, and governments in research, bargaining, arbitration, organizing, training, and government relations.

Dr. Donahue has established a long-standing and well respected relationship with the largest U.S. union representing utility industries workers, the International Brotherhood of Electrical Workers (IBEW), AFL-CIO. Specifically, he has assisted IBEW Locals 1245, 6, 125, and 48 on utility deregulation and related issues in administration, legislative, bargaining and arbitration proceedings regarding utility deregulation.

Dr. Donahue studied for his Ph.D. in economics at the University of Texas at Austin under former Secretary of Labor, Ray Marshall. Professor Marshall, the present "Andre and Bernard Rapoport Centennial Chair in Economics and Public Affairs" at the LBJ School of Public Affairs, author of the seminal work *"Unheard Voices, Labor and Economic Policy in a Competitive World"*, and one of the worlds most renowned authorities on High Performance Work Organizations, remains one of Dr. Donahue's strongest supporters and advisors.

Dr. Donahue received his Masters Degree in Labor Studies from the University of Massachusetts-Amherst and his B.A. in Economics from Columbia University in New York.

Instructors/Consultants:

As the essential support and resource base for the four Core Team members, I.P.I has assembled five qualified individuals to serve as instructors/consultants. The instructors/consultants consist of three educators, one IBEW union leader and one retired utility executive with a labor relations background. Working closely with the Core Team, they will assist with preparation by identifying case studies, practical experience and primary materials to research. Additionally, the instructors/consultants will help to coordinate work-site visits as well as take the lead in presenting specified areas of education and training for workers.

Hasan Crockett: **(Morehouse)**

Hasan Crockett, Ph.D., is an Assistant Professor of Political Science at Morehouse College. He teaches American National Government, State and Local Politics, and Public Administration. His research area is U.S. Labor History and the southern African American community. Dr. Crockett's present research is in the area of coalition relations between southern civil rights organizations and organized labor. He is examining contributing factors which impact the social role and performance of unions in relationship to the African American society. The degree to which these same factors have tended to reinforce manifestations of democratic practices, culture, and functions internal to the organizations themselves regarding structure, governance, and administration.

Dr. Crockett has made important contributions in helping labor unions propagate values of equality of treatment and representation of workers of different population groups regarding nationality, ethnicity, culture, language and religion. Reflecting appreciation of his work and reputation, he is widely respected in the ranks of organized labor and prominent labor studies departments.

The AFL-CIO Organizing Institute and major national unions constantly seek out his students for support and technical assistance in their work and campaigns. In addition, Dr. Crockett is a much sought after presenter and trainer by Labor Studies Centers, particularly in the Southeastern region. Most recently, Dr. Crockett was an invited fellow and trainer for Mississippi high school teachers at the Jackson State University Center for Labor Studies and Research in Jackson, Mississippi.

Steven Deutsch: **(University of Oregon)**

Steven Deutsch, Ph.D., has spent the last three decades as a visitor and member of faculties of several American and international universities, with strong emphasis on applied and policy-relevant areas. At the University of Oregon, Dr. Deutsch has been Professor of Sociology; Director of the *Center for the Study of Work Economy and Community*; Professor in Industrial Relations Graduate Program; and Professor in the Labor Education and Research Center.

His primary research activities have focused on labor-management relations, worker participation and work restructuring; technological change at work; work environment, occupational health and safety issues; labor market, workforce skills development, and economic policy issues. He has researched in public and private sectors and many industries including auto and aerospace, health care, telecommunications, and government.

Dr. Deutsch has been invited to give expert testimony before the U.S. Congress and the Oregon State Legislature. He has advised the Oregon Economic Development Department and Senate Labor Committee and helped in preparing legislation.

He has been asked to give presentations to professional staffs in the U.S. Congress Office of Technology Assessment, Health Care Financing Agency, National Institute for Occupational Safety and Health.

As a consultant and panelist for many U.S. governmental agencies he has participated in panels for the U. S. Congress Office of Technology Assessment, U.S. Department of Labor, National Institute for Occupational Safety and Health, U.S. Government Accounting Office, National Institute of Mental Health, National Institute for Environmental Health Sciences.

Dr. Deutsch has been a Senior Fulbright Scholar in Yugoslavia and Australia and visitor to universities in Sweden, Norway, England, Italy, New Zealand, Australia, and Canada. He has also been a guest of the Japan Institute of Labor.

International work has included consulting for international advisory boards for many institutions including: Swedish Ministry of Labor, Swedish Center for Working Life, Norwegian Work Life Center, Norwegian Work Research Institute, Norwegian Ministry of Health and Social Affairs, Australian Commonwealth Department of Industrial Relations, New Zealand Department of Labor, and international research bodies such as Canada Council and New Zealand Foundation for Science and Technology. Also, he is on the international editorial advisory board for Economic and Industrial Democracy Stockholm.

Dr. Deutsch has served on many advisory boards for unions, research institutions, research projects and programs in occupational health, workplace and technological change, and economic policy issues. In 1997-98 he advised the new AFL-CIO Center for Workplace Democracy. Other roles include the boards of Johns Hopkins University VDT Health Research Center, Work and Technology Institute, American Hospital Association Advisory Committee on Occupational Health and Safety, UAW/General Motors Human Resource Development Institute, and the American Friends Service Committee, consultant and lecturer at the Machinists Union Technology Center and the George Meany Center for Labor Studies.

He has published widely on many aspects of work and the economy and spoken to large numbers of universities and research institutes, unions, governmental agencies, public forums, management associations, and media sources.

Thandabantu Iverson:
(Indiana University Northwest)

Marion Thandabantu Iverson, Doctoral candidate, Political Science Department, Clark Atlanta University and Visiting Assistant Professor, Division of Labor Studies at Indiana University Northwest is a leading authority on the role of unions and effective Gender and Racial Diversity

Education and Training. These issues are particularly acute in industrial settings where significant diversification in the workforce is occurring in the context of deregulation, restructuring, and downsizing.

Professor Iverson has received praise for his work with employed and displaced steelworkers in Indiana by the Steelworkers union and the labor studies academic community.

Currently, Professor Iverson has focused on collaborative projects by the utilities industry, local government, the Indiana State AFL-CIO and the labor studies program to do "Train-the-Trainer" leadership development for union leaders in the deregulated utilities industry.

Professor Iverson has experience teaching other labor studies subjects regarding collective bargaining, labor history, contemporary union organizing, union democracy in a globalized economy, third world social movements, and trade unions in the underdeveloped world. In addition, he teaches courses in women's studies, comparative politics, African politics, and political theory.

**Rene H. Males
(Strategic Decision, Inc., IPI Board Member)**

Rene Males is President of Strategic Decisions, Inc., a firm specializing in strategic planning in the energy industries. This re-initiates the practice he had as a Principal in Decision Focus, Inc., a Los Altos, California consulting firm basing its practice on decision analysis techniques applied to energy, environmental and general business issues.

Mr. Males recently retired from IES Utilities where he had been President and Group Executive. IES is the electric and gas utility formed by the merger of Iowa Electric and Iowa Southern Utilities, where Males was President and CEO. Males has held executive positions with Wisconsin Electric and Commonwealth Edison. He was President of Joy Environmental Technologies, a firm producing and installing air quality control equipment and ash handling equipment. In addition, he was Vice President and Director of the Energy Analysis and Environmental Division of the Electric Power Research Institute, the research arm of the electric utility industry.

Mr. Males began his career in the utility industry at Commonwealth Edison where he was a member of the management negotiating team during two major full contract reopener negotiations. Also, he headed the negotiating team to determine equitable settlements when the company designed an on-line computer system for customer records and other service functions. During his executive career he participated in the management council determining negotiating positions at Commonwealth Edison, Wisconsin Electric, Iowa Southern and IES Utilities. Mr. Males served as the next to last step or last step negotiator in the grievance procedures at these three utilities. During his tenure at EPRI, Mr. Males was called on to participate in the training and development of senior union officials in the IBEW as well as two other unions.

He has an MBA from Northwestern University, where his field of concentration was labor economics. He lectured in their graduate business program as well as that of DePaul University. His undergraduate degree is from Ripon College in Wisconsin.

Mr. Males has been active in advisory roles to a number of organizations. Currently, he is a member of the National Coal Council, the advisory organization to the Department of Energy, and

is the NCC's policy committee Vice-Chairman. He has served on advisory committees to Brookhaven and Oak Ridge National Labs, to the Office of Technology Assessment, to the Department of Commerce and to a number of other agencies.

He has published articles on energy and environmental issues in a number of journals, contributed chapters to several books and has spoken frequently on these subjects.

Landis Martilla:
(IBEW)

Landis Martilla is a Business representative and lead organizer for Local 1245, of the International Brotherhood of Electrical Workers (IBEW). From his rank and file beginning as a member of the IBEW, Mr. Martilla experienced a steady rise through the union ranks due to his strong and consistent demonstration of principled leadership. He is widely respected now by both management and union people.

In addition to his other duties, he has assumed principal responsibility for coordinating the local's important health and safety portfolio. Health and safety has emerged as one of the most important issues of workers and their unions in the utility industry, particularly during this period of utility deregulation and down sizing.

In 1991, the Local 1245 leadership and PG & E were negotiating an agreement to jointly structure a labor-management participation program. Mr. Martilla served as one of the spokespersons for the rank and file who were concerned about protecting their interests during the negotiations process.

In 1955, the San Mateo County Labor Council (one of the strongest labor union bodies in the U.S.) chose Mr. Martilla as *unionist-of the year* for his exemplary practice of trade union solidarity. He has a Bachelor of Arts Degree in Psychology with a concentration in Labor Studies, from San Francisco State University.

Resource People:

Robert Baugh:
(AFL-CIO)

Robert Baugh is Assistant Director, AFL-CIO, Human Resources Development Institute of the AFL-CIO. Mr. Baugh has written for important labor publications including Labor Research Review. He has also authored publications addressing workforce development strategies and the role of high performance work organizations.

Recently, Mr. Baugh served as one of the two lead investigators and writers for the AFL-CIO publication, "*Economic Development, A Union Guide to the High Road*". The publication of "*Economic Development....*" Represented a collaborative effort between the AFL-CIO, the Human Resources Development Institute, and AFL's Corporate Affairs, Education, Field Mobilization, Public Policy, and Public Employees Departments.

Previously, Mr. Baugh served as Secretary-Treasurer of the Oregon AFL-CIO and as Partnership Division/Workforce Development Manager for the Oregon Economic Development Department.

Dan Holub:
(IBEW)

Dan Holub is the Business Manager for IBEW Local 204 in Cedar Rapids, Iowa. The International Brotherhood of Electrical Workers (IBEW), is the largest AFL-CIO affiliated labor union in the U.S. representing workers in the utility industry, particularly the electrical utility sector. IBEW, Local 204 represents workers with IES utility workers in Iowa.

Mr. Holub is widely respected as one of the most progressive labor leaders in the IBEW nationally and he serves on the national unions' National Committee on Utility Deregulation.

He has strong expertise regarding comparative approaches to Labor Relations and Collective Bargaining with particular emphasis on the utility industry.

Roberta Till-Retz:
(University of Iowa)

Professor Till-Retz is Program Consultant at the University of Iowa Labor Center, Iowa City, Iowa. She is one of the country's leading experts in the field of labor relations and collective bargaining. As a leader in the national University and College Labor Education Association, Professor Till-Retz is the current Managing Editor of the pre-eminent scholarly "refereed" labor publication in the U.S., the *Labor Studies Journal*.

She has written influential studies regarding the evolution of Labor Negotiations and Collective Bargaining as a process in the context of *New Work Systems*.

Recently, Professor Till-Retz returned from South Africa, on a study tour of the Kimberly Region of Northern Cape Province. There she served as the chief investigator on a study tour of Labor Relations in the Education Sector of the Kimberly Mining area.

The tour was undertaken at the invitation of Dr. Zodwa Dlamini, the Deputy Director General of Education in the Northern Cape, facilitated by Aurora Associates, Inc., and funded by USAID. It was designed to take advantage of Prof. Till-Retz's expertise in Labor Relations in order to strengthen the current transitional phase of Education Sector Labor Relations in the Northern Cape Province.

Morehouse College/IPI

Morehouse College faculty and students will also serve as resource people during the proposed training program.

EXHIBIT B
Short Term Training
Labor Relations Team Responsibilities

MEMBERS	COURSE DEVELOPMENT	TRAINING			
		Week 1	Week 2	Week 3	Week 4
CORE TEAM					
Dennis Orton (leader)	X	X	X	X	X
Ashaki Binta	X	X	X	X	X
Peter Donohue	X	X	X	X	X
Lee Schore	X	X	X	X	X
INSTRUCTORS/COUNSELLORS					
Hasan Crockett	X	X			
Steven Deutsch	X			X	
Thadabantu Iverson	X				X
Rene Males	X	*	X	*	*
Landis Mantilla	X	X			
RESOURCES					
Robert Baugh	X				
Dan Holub	X				
Roberta Till-Retz	X				

*Available in SA for consulting with Team on ESKOM management.

**Short Term Training Program
(Four Week)
Budget***

PERSONNEL

Core Team (4 people)	\$ 50,000
Instructors/Consultants	32,000
Secretary	8,000
	90,000

TRAINING MATERIALS PREPARATION 45,000

EVALUATION ACTIVITIES AND FINAL REPORT 15,000

TRAVEL

US/ South Africa (Core Team and Instructors)	30,000
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EQUIPMENT/SUPPLIES

(Office equipment, audio equipment, and teaching supplies)	15,000
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MOREHOUSE COLLEGE / IPI OVERHEAD COST 90,000

TOTAL \$ 285,000

*It is assumed ESKOM will provide meals and lodging at one of their local training facilities as well as local transportation in South Africa.

Long Term Training Program for ESKOM Union Leaders

Three Month Training Module

Long Term Training Program

The long term training program for ESKOM will be constructed in three separate one month modules (more detailed break-downs will be drawn out after summing up the results of the four week short term school.)

The key components of each of the one month trainings will be structured class room work combined with site visits to identified labor studies centers as well as work-site visits to electric utility workplaces represented by the International Brotherhood of Electrical Workers Union (IBEW). Other resources will be sought when such needs are identified.

The Long Term Training Program will involve simulation, role-play, and homework in keeping with our established emphasis on “Do-it-Yourself” learning. Study will also take the form of interactive workshops, case-studies, and practical exercises. Classroom teaching will again be led by the Core Team, Core Team Advisors/Instructors, and qualified faculty from Morehouse College and the University of Oregon. There will also be presenters from the U.S. Department of Labor, Morehouse College Faculty and the Cornell School of Industrial Relations. Worksite visits will feature union leaders and management people conducting interviews and participating in Round-table discussions.

Month One: Main Theme – Democratic Unionism

- South Africa — Classroom work will be at ESKOM’s Training Center in South Africa

Week One: Collective Bargaining Training Seminar

- Simulations, Evaluations, and Case Studies
- Comparative analysis of Relevant Labor Law, S.A. and U.S.
- Comparative Assessment of Collective Bargaining Infrastructure, Public and Private Sector, S.A. and U.S.
- Management/Union “Unfair Labor Practices” and Filing Process
- Union strategies for Leverage/Management strategies for Leverage Establishing Bargaining Relationship
- Legal requirements for Bargaining, Notification, Right to Information, Strike Authorization
- Process Overview: Research and Setting Goals, Organizing a Contract Campaign, Role of Negotiating Committee, Rank and File Support Structures, Membership Surveys
- Table Skills

- Permissive and Mandatory Subjects of Bargaining
- Open Negotiations, Traditional Bargaining, New Approaches
- Contract Ratification
- BATNA (Best Alternative To A Negotiated Agreement)

Week Two: Grievance Handling and Arbitration Resolution

- Case Studies, Role Play, Practical Assignments
- Grievances: Role to Address Disputes On The Job and Enforcement of Provisions of C.B.A. (Collective Bargaining Agreement)
- Definition of Grievances
- Investigation and Research
- Evaluation of Merit in terms of Standard of Just Cause, Past Practice, Progressive Discipline, Equal treatment, Applicable Law
- Do's and Don'ts of How to Write An Effective Grievance
- Grievance Steps and Time Limits
- Do's and Don'ts of Presenting Grievances to Management
- U.S. Law Including Weingarten, Duty of Fair Representation, Special Status of Union Stewards
- Legal Rights of Information Requests
- Arbitrations: Analyze Labor Law and Logic Applied by Arbitrators to Grievance Decisions
- Review of Case Studies on Discharge and Discipline for Job Performance, Insubordination, Seniority Application, Leaves of Absences, Management Rights, Union Rights
- Examination of "Seven Tests for Just Cause" Discipline
- Review of Arbitration Process: Evidence in Arbitration, General Evidentiary Issues, Evidence and Grievant, Evidence and Due Process Consideration, Interpreting the Contract, Weight of Other Proceedings
- Selection Process for Arbitrators
- Unions and Management Strategies Regarding Cost and Politics of Arbitration
- Alternatives to Arbitration

Week Three: Identified Site Visits in South Africa

- Interviews, Round Table Discussions

- South African site visits to be scheduled

Week Four: Union Organizational Structure, Administration, and Governance

- Survey of Union Structures designed for organizing, membership recruitment, internal organizing campaigns, education and training, and membership participation, knowledge, and responsibility
- Structures for successful collective bargaining
- Structures for successful contract administration and enforcement
- Structures for political activity
- Structural relationships between members, local unions, affiliate sector and industry organizations and national unions
- Constitution and By-laws, primary documents and labor law

Month Two: Main Theme—Leadership Development

- Classroom work will be held at Morehouse College in Atlanta, GA.

Week One: Overview

- Defining Leadership
- Role of effective administration, management, evaluation
- Identifying and developing new primary and secondary leadership
- Delegating Authority
- Developing Collective Leadership
- Establishing structures and processes to facilitate democratic leadership
- Leaders as negotiators, mediators, and practitioners of dispute resolution
- Role of leaders in developing a vision, program, and strategy
- Creating inclusive environments

Week Two: Meeting Organizational and Political Challenges

- Union Leaders as organizers
- Union Leaders as coalition and consensus builders
- Union Leaders as catalysts for social and political change

Week Three: Work-site Visits/Round-table Discussions

- IBEW 5th Regional District in Birmingham, Alabama

- IBEW System Council Four (4) in Palm Beach Gardens, Florida
 - ***** Sites involve workers from Georgia Power headquartered in Atlanta, Georgia (owned by the Southern Company) and Florida Power and Light in Florida.
- Round table discussions with IBEW's National Committee on Utility Deregulation and representatives from IBEW, IUE, and other national unions regarding challenges to union leadership and union solidarity in a deregulated, global market.
- There are also plans to visit relevant workers center in the more rural areas of the South. These areas contain some problems of underdevelopment that exist in the US that are similar to those faced by ESKOM and its workforce in South Africa. Visits to the West Coast are also planned. This process is designed not only to give the long term training a nation-wide scope, but also to reflect the uneven development of the US trade union movement.

Week Four: Workforce Diversity and Women as Union Leaders

- Issues of Gender Equality, examining precepts that “equality” is not a by-product of democracy. There is a need to deliberately confront all manifestations of women’s inequality to ensure that gender equality is an integral part of democratic transformation
- Globalization, women, and gender inequality
- Identifying, developing, and promoting women as leaders in the workplace and the union
- Examining the increasing “feminization of poverty”, especially among African Americans in the U.S. and in South Africa’s majority Black population
- Issues/Challenges to women’s leadership:
 - Women and work
 - Dignity and respect
 - Gender specific impacts of public and economic policy
- Issues of accommodating work force diversity and some of the new challenges it creates will be reviewed. The Focus will be on the Union role in dealing with these issues.

Month Three: Main Theme—Economics

- Classroom work will be held at Morehouse, in Atlanta, GA but fieldtrip will be organized to Midwest and West Coast

Week One: “Popular Economics Course for Workers and Union Leaders” (LERC)

- “Common Sense Economics” with the AFL-CIO Department of Education
- Productivity Gains and Wages
- Stock Market: Barometer of Economic Well Being or Misery Index

- Income distribution and Labor Market Economics
- Economic development, Overtime, and Joblessness
- Politics of Apprenticeships and Training: Skills Enhancement, Education and Power Issues Impacting the Unemployed and Underemployed
- Tax Policy and Working Families
- Budgets and Fiscal Policy
- Minimum Wages versus Living Wages
- Economics of Affirmative Action

Week Two: “Unions and Economic Competitiveness”

- Trade Deficits and Unions: Myths and Realities
- Unionization and the Rate of Growth of Productivity
- Unions and Profits: Impact of Industrial Relations Climate
- Unions and Technological Change: Collective Bargaining, Technological Change and Union Policies, Technological Change
- Unions and Macro Economic problems
- Union Effects on Aggregate Savings and Investment
- Union Wage Gains and Economic Welfare
- Unions Economic Performance

Week Four: Globalization and Comparative Political Economy of Industrial Relations

- Case Studies on the Impact of Global Economic Policy
- Unions, Labor Movements and Industrial Restructuring
- International trends in Work Organization in the Private and Public Sector
- Linkages between economic Development Strategies, Industrial Relations Policy and the Workplace. Case Studies: Japanese; Mexico; Swedish; German; Canadian
- Compare and Contrast with Discussed Trends in S.A. and U.S.

Projected Daily Classroom Schedule for the Three-Month training program

8:00 – 08:30	Breakfast
08:30 – 10:15	Review Homework/Site Visits, etc.,
10:15 – 10:30	Break
10:30 – 12:00	Classroom Work
12:00 – 1:00	Lunch
1:00 — 3:00	Classroom Work
3:00 – 3:15	Break
3:15 – 4:45	Classroom Work
4:45 – 5:00	Homework Assignment
5:00 – 6:30	Personal Time
6:30 – 7:30	Dinner

Labor Relations Team for Long Term Program

The Training Team for the Long Term Program will include all members of the Short Term Team. Moreover, it is now perceived that "Resource" Team members will participate as "Instructors" along with the current member of the "Instructors/Consultants." The role of each member of the overall Team, While already conceptually defined, will depend on a more detailed program design. In addition, Morehouse College faculty and students will serve as resource people for the proposed Long Term Program.

Exhibit C outlines the Team composition and some of the roles that have already been assigned.

Exhibit C
Long Term Training
Labor Relations Team Responsibilities

MEMBERS	COURSE DEVELOPMENT	TRAINING			
		Session 1	Session 2	Session 3	Session 4
CORE TEAM					
Dennis Orton (leader)	X	X	X	X	X
Ashaki Binta	X	X	X	X	X
Peter Donohue	X	X	X	X	X
Lee Schore	X	X	X	X	X
INSTRUCTORS/COUNSELLANTS					
Robert Baugh	X				
Hasan Crockett	X	X			
Steven Deutsch	X			X	
Dan Holub	X	X			
Thadabantu Iverson	X				X
Rene Males	X	*	X	*	*
Landis Mantilla	X	X			
Roberta Till-Retz	X	X			

*Available in SA for consulting with Team on ESKOM management.

Long Term Training Program (Three Month) Budget*

PERSONNEL

Core Team and Instructors	\$ 229,000
Secretary	<u>15,000</u>
	244,000

TRAINING MATERIALS PREPARATION

30,000

EVALUATION ACTIVITIES AND REPORT WRITING

30,000

TRAVEL/SUBSISTENCE

US/South Africa (Participants and Core Team)	52,000
US Domestic Travel (Atlanta, California, Chicago)	23,000
Subsistence in US During Travel	42,000

BOARDING/MOREHOUSE COLLEGE

(2 Months Boarding and Food) 40,000

EQUIPMENT/SUPPLIES

(Office and Audio Equipment) 15,000

MOREHOUSE COLLEGE / IPI OVERHEAD COST

144,000

TOTAL

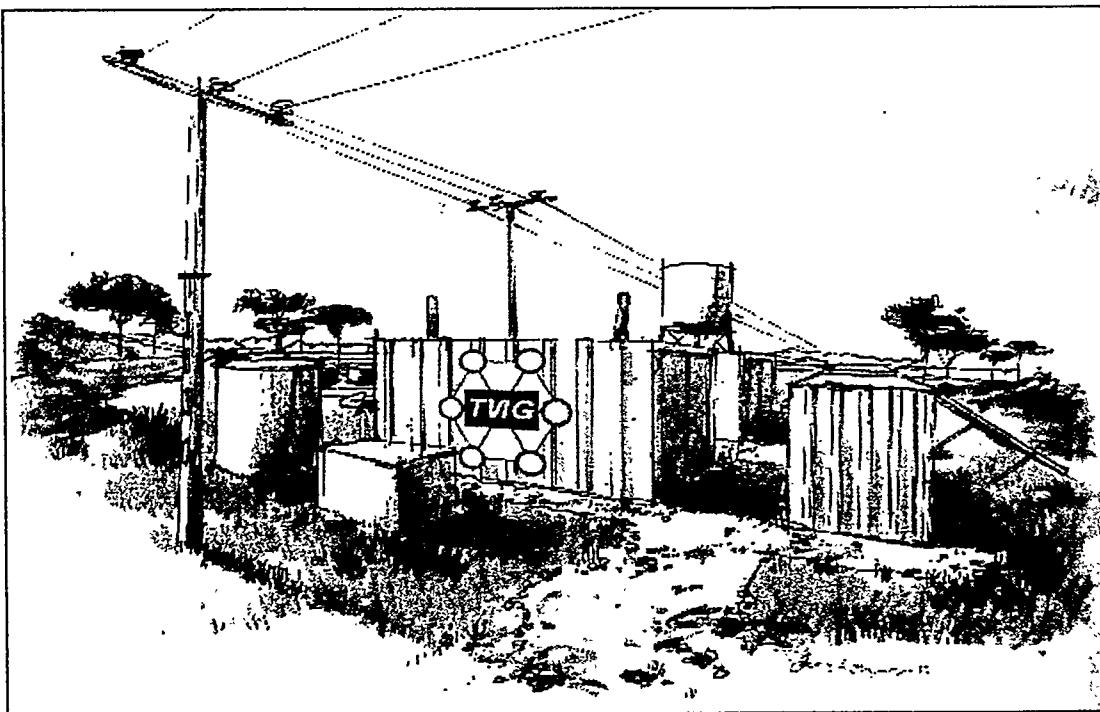
\$ 620,000

- * Except when on field trips, it is assumed that ESKOM will provide meals and lodging at one of their local training facilities as well as local transportation in South Africa. Also, it is assumed that Morehouse will provide trainee and instructor facilities at the college.



Morehouse College International Power Institute

and
Tennessee Valley Infrastructure Group, Inc.
for
Cantarranas, Honduras



Feasibility Study Report April, 2000

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**Morehouse College
International Power Institute
And
Tennessee Valley Infrastructure Group, Inc.**

Tres Valles Project/Cantarranas

Executive Summary Description

TVIG is please to present a proposal for an Integrated Infrastructure Platform for the Tres Valles Cantarranas location. This proposal compares two options for power generation and water purification. The unit is intended to be operated as a separate business entity from the sugar refinery.

TVIG investigated the applicability of installing an IIP unit in or near the town of Cantarranas (San Juan de Flores) from March 6-8, 2000. The investigation included an economic assessment of the town and surrounding area (Tab 2), an equipment list and design cost estimate for two options (Tab 3) and financial projections for the two options under the conditions determined during the Economic Survey (Tab 4).

The options for the Tres Valles Project assume a "Design Basis Operation" (DBO) of:

- 1360 kW of diesel power generation (2 x 680 kW) and 50,000 liters/day water production capacity
- 1636 kW of diesel power generation (2 x 680 kW) and 55,000 liters/day water production capacity

The design reliability factor at DBO is 95%.

The Tres Valles Project will be assembled and tested at TVIG's Tennessee location, then shipped and installed in ready-to-operate condition with minimum on-site construction. Installation, startup and operation can typically occur within a few weeks of the IIP's arrival.

Technical Description

Siting: TVIG recommends locating the unit on a site near the existing diesel fuel storage and pumping station at the sugar refinery. This location reduces the infrastructure required to support the unit, makes installation of foundations and other structures simple and eases access for maintenance. It also minimizes the distance from the unit transformers to the grid tie-in and raw water supply. A location within the existing physical protection boundary will reduce security risks to the unit.

Structures: The housings for the Tres Valles Project are the standard ISO sea-land shipping containers used to ship the components. Each diesel generator is

housed in a separate 40-foot container that has been structurally modified to support additional weight and provide for access, ventilation and sound attenuation. The water unit and the integrated control room are housed in a separate container. Local structures (water and fuel storage tanks, transformers and pumping station) are built prior to IIP arrival using local labor and materials.

Electric Power: The Tres Valles Project provides options of 1.32 MW (2 x 0.680 MW) and 1.63 MW (2 x 0.818 MW) power generation capacity configured to operate in parallel with the national grid. Two Cummins diesel engines (3 ϕ , 0.8 p.f., 60 Hz) capacities are sufficient to allow an outage of one diesel for repair and maintenance under most conditions. Estimated fuel consumption at DBO is 1400 and 1700 gallons per day for the two options.

The above calculations assume the generator ties into the national grid outside the sugar refinery "knife switch" but with the tie located . TVIG can also provide an automated breaker

Water: Water purification is provided through a water distillation unit that uses the diesel generator waste heat to boil the raw water. Raw water will be fresh water from the existing Tres Valles source. Water distribution is assumed to be through a bulk water dispensing system with a limited amount distributed daily for Tres Valles use.

Control and Optimization: The IIP systems are monitored from an integral control room located in one end of the ISO container with the water purification equipment. The control room houses all instrumentation, control panels and communications equipment as well as the fire suppression and physical security monitoring equipment. Data critical to equipment performance is logged via small computers in the control room. This data is regularly transmitted via telephone modem link to a remote site for performance monitoring and optimization purposes.

Transportation: Included with the IIP system will be a test tract of road improvement using the UBIX™ enzyme soil compaction agent. Two barrels of the agent will be applied to approximately 6 km of graded and compacted roadsurface.

Management, Maintenance and Administration: The Tres Valles Project will include an integrated management and administration package that will include operation, maintenance and administration of the unit as a separate business entity from the Tres Valles Sugar Refinery.

Future Design Changes: The IIP is a flexible design that permits many variations in the base configuration. It is also designed to allow rapid addition of new capacity when needed. TVIG maintains a computer model of the operating cost curves, financing plans and business plan for the Tres Valles unit.

Financial Performance

The projections included in Tab 4 assume operation at a nominal 75% load factor for 18 hours per day and 25% load for six hours per day with corresponding water

production. They also assume a tariff of \$0.11/kWh (L 1.6) on energy sold to ENEE and \$0.065 (L 0.95) sold to Tres Valles during the "dead season" for sugar processing.

Option One – 1.32 MW: The unit will provide a gross return of \$391,412 (L 5.7 million) per year on an annual revenue of \$1,209,742 (L 17.8 million). This assumes that

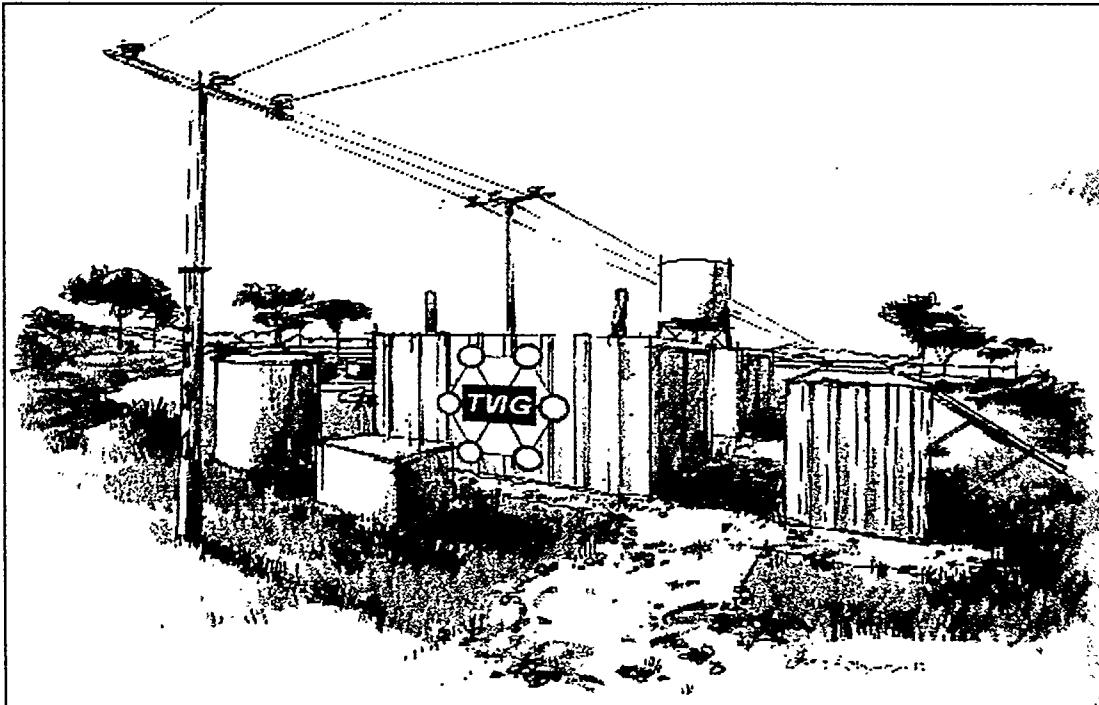
Option Two – 1.63 MW: The unit will provide a gross return of \$530,725 (L 7.8 million) on annual revenue of \$1,502,213 (L22 million).

Management Issues

Tres Valles intends to operate the Integrated Infrastructure Platform as a separate business managed independently from the sugar refinery. TVIG has contacted several Honduran businesses experienced in power generation operations who are interested in operating, managing and administering

Morehouse College International Power Institute

**and
Tennessee Valley Infrastructure Group, Inc.
for
Trojes, Honduras**



Feasibility Study Report April 2000

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EXECUTIVE SUMMARY

Trojes, Honduras

Morehouse College International Power Institute and Tennessee Valley Infrastructure Group

Abstract

In February 2000, a 12 member team from the Tennessee Valley Infrastructure Group performed an in-depth pre-feasibility study for a hybrid Integrated Infrastructure Platform (IIP) for Trojes, Honduras. Trojes has a rapidly growing population (approx. 4%/year) and cash economy (approx. 3.8%/year) based on strong and diverse agricultural activity.

Trojes, with a greater municipal population of approximately 39,000 currently receives electricity from Nicaragua and is plagued by frequent outages and brownouts. The cost for electricity in Trojes is among the highest in Honduras (Lps.2.5/kWhr), thus representing a significant barrier to the establishment of energy-intensive businesses such as coffee dryers. Potable water supplies are inadequate and often of poor quality. Wastewater treatment is insufficient. The current system, while new, is deteriorating rapidly due to poor management, and even when working properly, discharges nutrient-rich effluent into surface water sources.

TVIG's initial technical and economic analysis of Trojes demonstrates that a privately owned company could successfully operate a public utility for a profit with the goal of exporting energy to Nicaragua.

Possible IIP configurations considered in TVIG's study included both diesel and hydro electrical generation as well as water purification and wastewater treatment. Trojes has the potential to support an independent Integrated Infrastructure Platform for both subsistence-level production and power export to Nicaragua. Three possible options are presented below, with "Option 3" being the most commercially viable.

Configuration	Total Investment/ Equity	Gross Revenue Year One	Gross Return Year One	Fuel Costs Year One
800 kW Hydro (only)	\$1.55 m/ \$387.5k	\$375 k	\$114 k	\$ 000k
800 kW Hydro 2 x 224 kW Diesel	\$2.18 m/ \$545.0k	\$1.05 m	\$315 k	\$255k
800 kW Hydro 2 x 680 kW Diesel	\$2.7 m/ 4675.0k	\$1.25 m	\$452 k	\$407k

Project Finance

Preliminary conversations (pre-qualified investor) indicate that there are several viable funding sources in both Honduras and the United States for a project in Trojes. The Honduran sources, which have quoted interest rates of 9% to 14% in US dollars, include the Central American Bank for Economic Integration (CABEI) and Banco Futuro. Finance sources in the US include IFC and EXIM Bank. The IFC has made an initial commitment to support IIP projects in Honduras contingent upon local participation. IFC will take a position (equity or debt) not to exceed 35 percent of the project cost, and would bundle all four probable Honduran projects together.

Description of Trojes

The town of Trojes lies approximately 78 km. south of Danlí in the Department of El Paraiso. The greater municipality boasts a population of approximately 40,000 and an urban population of approximately 6,000.

Economic Situation

Trojes has a vibrant and growing economy. Current population growth is approximately 4.5% according to sources in the municipal government, and economic growth is roughly estimated in the range of 3.5% to 4.0%. Much of the growth is derived from a vigorous agricultural economy. Coffee, cattle ranching and lumber extraction are the key economic activities, with truck gardening and dairy production contributing modestly to the local economy. At the same time, Trojes is typical of many border towns in that criminality is significant and transportation is difficult. There are currently no national banks in Trojes due to frequent robberies; however, there are several savings and loan cooperatives.

Key Site Contacts

Arq. Rina Rodriguez Director, Energy Department, Ministry of Natural Resources

Magda Patricia Videá, Mayor, Trojes, (Tel: 011-504-887-7404)

Ing. Marco Antonio Barahona, Director, Municipal Electric Company

Current Infrastructure Systems

Electricity

The electricity in Trojes comes from Nicaragua. Transfer payments between Nicaragua and Honduras are made through the national government and ENEE. Currently, ENEE sells the energy to the Municipal Energy Company (EMEL) for distribution. Energy prices are high, with EMEL purchasing power from ENEE at 1.4 Lps. per kWh, and selling it to the consumer for between 2.3 and 2.5 Lps. per kWh, making it some of the most expensive energy in Honduras.

Voltage at Interface:	30,000v - 13,800 v - 120/240v
Frequency:	60 Hz
Grid Configuration:	Ring
Price/kWh bought:	\$0.099/Lps. 1.45 (paid to ENEE)
Price/kWh customer:	\$0.17/Lps. 2.4
Site:	Hydro would be 12 to 25 kilometers out of town.
Meters in 1997	472, used 40,000 kWhs at 1.60 Lps / kWh
Meters in 2000	920, used 54,500 kWhs at 2.50 Lps. / kWh
Total Bill for Town:	\$5,079.50/month (does not include shrinkage)
Average monthly Bill:	\$29.59 per user

- Users of less than 300 kWhs. receive a subsidy from ENEE.
- Industrial and household users pay the same price for energy.

- Three rivers offer significant hydro potential. Two demonstrate significant potential for developing storage capacity with minimal environmental impact. The three rivers include the Rio Guano, Rio Chiquito and an unnamed river commonly referred to as "Rio Cascada." Rio Cascada presents the best hydro potential. Its watershed falls 80% within a single landowner's property, thus providing for relatively good protection of the resource.
- Industry wants to come, but can not afford the energy bill (eg. coffee dryers)
- Because electricity is expensive, people use firewood for cooking, resulting in a serious deforestation problem.
- Have done the study to connect Trojes to the national grid. The distance is 37 Km, with a project cost estimated four years ago at approximately 10 Million Lempiras (\$704, 225.35 USD)

Potable Water:

There is a municipal water distribution system. However, water supplies via the municipal system are highly unreliable with some users receiving water for only a few hours each week. The municipality estimates it distributes 200,000 gallons per day. Furthermore, municipal water is often contaminated. According to municipal engineers, the distribution system lacks appropriate check valves and pressure regulation equipment. Currently, bottled water is trucked in from Danlí. Most of the small shops sell bottled or bagged water. Totaled, the bottled water demand in Trojes is currently approximately \$ 12,712 per month for a total of 61,500 gallons per month.

Wastewater Treatment Systems:

Much of the town center is connected to a centralized collection system built in 1994, which delivers sewage to a passive oxidation lagoon system. The collection system, although new, suffers from numerous leaks resulting in large soggy areas in which pigs can be seen feeding. The dual lagoon system is in danger of failure, with the drain between the first and second ponds blocked and raw sewage breaching the dike of the first pond near the influent pipe. The second lagoon is dry and has large, woody vegetation growing throughout. Minor maintenance could resolve these problems if performed immediately. However, even with both lagoons operating as designed, nutrient-rich water is discharged into a small, running stream, which is used by a nearby Nicaraguan town as both washing and drinking water.

A low-cost ReCip™ reciprocating constructed wetlands system would be installed to treat the effluent from the lagoons to deliver nutrient-free discharge to the surface water source.

Roads:

All roads in town are dirt, as is the 76 Km. access road. Road conditions vary, with the main access road reportedly being impassable at times during the wet season. Road condition could be greatly improved at a reasonable cost by applying a soil stabilization product such as UBIX 10.

Integrated Infrastructure Platform

TVIG analyzed three distinct infrastructure packages that would enable Trojes to meet its needs and achieve energy independence. They include the following.

Option 1: Small Hydro Only (500 kW)

This option includes only a small hydro unit with an 800kW turbine generating a projected 500kW. This unit will only just meet the current energy demands of Trojes and has a high capital cost with a very low (5%) return on investment. Furthermore, it is vulnerable to drought and poor watershed management. (See table above)

Option 2: Hybrid Diesel/Hydro (950 kW)

This option includes both a small hydro turbine and two small diesel generators. This option offers the reliability and relatively low capital cost of diesel generation with the low operating cost of a small hydro installation. However, this option does not provide for the export of energy to Nicaragua since it produces only enough energy to meet the projected growth in demand for Trojes. (See table above).

Option 3: Hybrid Diesel/Hydro (1,820 kW)

This option is the preferred option, combining the benefits of both diesel and hydroelectric energy, with enough excess capacity to both meet the needs of Trojes and sell excess energy to Nicaragua. Furthermore, it will generate enough income to reinvest in additional hydro turbines (on the remaining two rivers) to bring the total energy production of the project to 3.2 to 4.1 MW, depending on the results of stream flow analysis. (See table above).

An important added benefit for Options 2 and 3 is the opportunity to capture the waste heat for co-generation applications, such as heating locally operated coffee dryers, and for operating water distillation units.

Environmental Considerations

The most significant environmental concern is the threat to the investment in the small hydro turbines posed by the deterioration of the surrounding watershed. Of the three rivers surveyed the watershed of only one lies within one landowner's property. The remaining two are of dubious quality, and they appear to be tending towards further deterioration. The lower watershed for the Rio Guano is has been deforested and is being used for extensive cattle production. The watershed for the Rio Pital is being used primarily for coffee production and from a cursory inspection appears to be in better condition.

Development of the thermal portion of this project should include the institution of operational procedures, which would ensure the proper handling and disposal of fuels, lubricants and discarded supplies to prevent contamination of groundwater and subsurface water. Furthermore, precautions should include spill containment and response elements in the IIP design.

Tariff Structures and Impact on Growth

The residents of Trojes currently nearly Lps. 2.5 per kWh, one of the highest rates in the country. This high cost of energy represents a significant barrier to the development of "value added" activities such as coffee drying and the energy-intensive processing of primary agricultural products. Furthermore, unreliable service results in significant losses in perishable foodstuffs and medicines, which are ruined when refrigeration is lost. In addition, many residents incur a significant cost by purchasing, operating and maintaining back-up generation capacity.

One of the goals of the installation of the IIP is to lower the cost per kilowatt hour to the consumer to stimulate economic activity and attract value added activities, while at the same time generating enough energy to export to Nicaragua, and generating a profit for the IIP's investors.

Opportunities for Expansion

The TVIG IIP is scalable, with its diesel capacity easily expanded to accommodate a growing demand. In addition, turbines may be added to the two remaining rivers at a later date to boost the hydroelectric potential of the package. The IIP's control system may be designed to accommodate the future addition of turbines.

Trojes Project
for
Trojes Utility Company (TUC)
by
Tennessee Valley Infrastructure Group, Inc.

Approximate Sequence of Events

Phase I – Project Definition

Meeting with Investor/Letter of Intent (TUC/TVIG)

Decision on Basic Options (TUC)

- Siting
- Ownership model
- Define services (power generation, water purification, wastewater treatment, coffee drying)
- Determine financing preferences (equity/debt split, "pref" shares, municipal bonds)
- Identify TUC's Lawyer
- Draft Contract for Project Development

Contract for Project Development (TUC/Investor contracts w/ TVIG on cost plus 10% basis, not to exceed \$80,000- \$25,000 initial payment)

In-country research on:

- Financing (\$10,000)
- Design investigation, grid extension & small hydro data collection (\$10,000)
- Legal, Management & Logistics (\$50,000)
 - Permitting & tariff restrictions
 - Tax relief on fuel
 - Local contractors
 - Transportation
 - Identify Manager
 - Define management systems, accounting convention and performance standards
- Environmental Impact Review (\$10,000)

Final Report, Design Specifications and Price Quotation (TVIG)

- Determine Coffee Drying Options
- Insurance
- Management & Maintenance Contracts (Honduran)
- Draft Final Contract & Terms & Conditions

Project Contract Signing (TUC & TVIG)

- 20% Initial Payment
- Guaranteed Letter of Credit for:
 - 40% payment at completion of US full power testing
 - 40% payment of completion

Phase II – Project Construction, Testing & Operation

Procurement & Construction

On-site Construction & Grid Extension

US Side Testing

Management and Technical Training

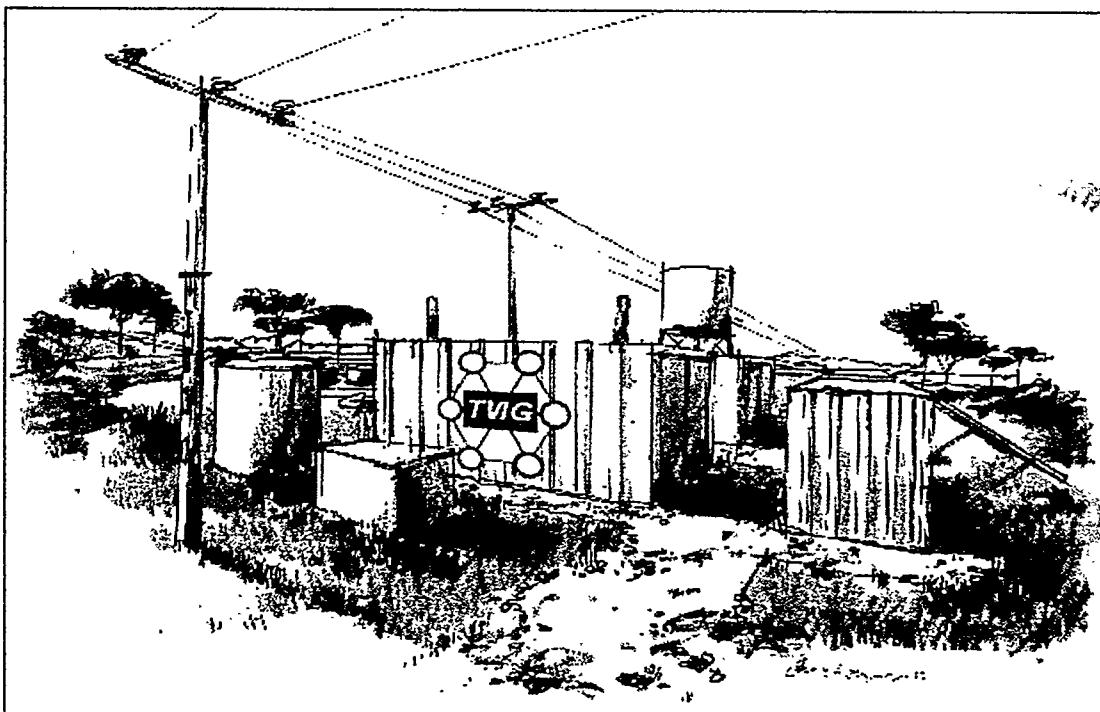
Delivery, Setup & On-site Testing

Commercial Turnover

Management Oversight & Support (separate contract tied to management cost fee in operating cost)

Morehouse College International Power Institute

**and
Tennessee Valley Infrastructure Group, Inc.
for
Utila, Honduras**



Feasibility Study Report April 2000

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And
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Utila Project

Executive Summary

IPI evaluated Utila's requirements for basic infrastructure from March 13-15, 2000. IPI agrees with the assessment of Utila's leaders that the island's services at present are marginally adequate. Additionally, the current level and quality of service are inadequate for continued rapid growth in tourism and development, and the care given by ENEE to environmental aspects of providing the current service is detrimental to Utila's further economic prosperity.

This pressing need for improved infrastructure and environmental stewardship presents an opportunity to make Utila a model for sustainable development. TVIG will develop with Utila's core investors an integrated package that quickly provides for the island's immediate needs, that has capacity for future expansion and that allows for local self-control and monitoring.

To summarize the needs, a successful program for Utila should provide for:

- extension of electric service to the cays and other development projects on the western end of the island, the new airport and future cruise ship facilities,
- 24-hour per day electric generation capacity to meet or exceed the demand after service is extended with a reliability factor of 97%,
- use of a portion of the thermal energy from electric generation process to purify water for bulk distribution,
- use of a portion of the thermal energy from electric generation to produce ice for commercial sale to hotels and fishermen,
- evaluation and use of the island's significant wind energy potential to supplement thermal energy,
- addition of a number of distributed wastewater treatment systems to stop discharges of harmful wastewater and water-borne nutrients onto the reefs,
- automated and integrated control of these services and functions,
- a management program for administering and regulating this system by a privately owned, municipal utility,
- minimum environmental impact and an operational spill mitigation procedure,
- return on investment and cash flow sufficient to provide operating reserves and to fund upgrades and expansions.

While achieving these objectives, cost must be minimized, and financing must be arranged on the most beneficial terms. IPI's investigations indicated that significant funding is available for municipal projects such as Utila, through both Honduran and US sources. Specifically, the Central American Bank for Economic Integration (CABIE) has established a *Pro-Muni* fund specifically for such projects. Utila's core investors have pledged the required equity portion of the basic IIP package, and TVIG will assist in obtaining the debt financing.

TVIG will work with Utila to obtain outside funding for portions of this project. IPI cannot guarantee outside funding at this stage, but it may be possible, for instance, that USAID funding may be applicable for installation of the ReCip™ wastewater treatment systems. TVIG's

discussions with USAID and the US Army Corps of Engineers on this possibility are very encouraging.

This report outlines the project from the technical and economic standpoints, including a Market Report, Design Description, Equipment Cost List and a Financial Analysis for the project based on TVIG's March 2000 visit. Also included is a contract for a "Project Development" phase that will have TVIG provide the assistance needed to:

- create a "Utila Utility Company" to organize the equity investors and to write the business plan necessary to obtain financing for the project
- identify necessary permits and quantify fees and other legal expenses associated with incorporating the utility and obtaining the appropriate tax status for fuel and income for which "UUC" would be responsible
- define UUC's management systems, accounting conventions and performance standards
- survey and design the extension of the existing electrical distribution system
- ensure that the design complies with environmental regulations and that evaluations and emergency procedures are completed in accordance with Honduran law

The study evaluated three unit configurations for the Utila Project. The first utilizes diesel power only, the second diesels and one wind turbine, and the third diesels and two wind turbines. The same variables are used in each financial model, with the exception of capital cost and the amount of renewable energy available to offset diesel fuel consumption. The assumed diesel fuel cost is US\$ 1.30/gallon, the electricity cost is US\$ 0.09/kWh and the wholesale cost of the distilled water is \$0.03/liter. The hardware package includes the diesels, the wind turbines (where appropriate), the distribution extension, the water unit and the insurance, shipping, and other miscellaneous project inputs.

The results are as follows:

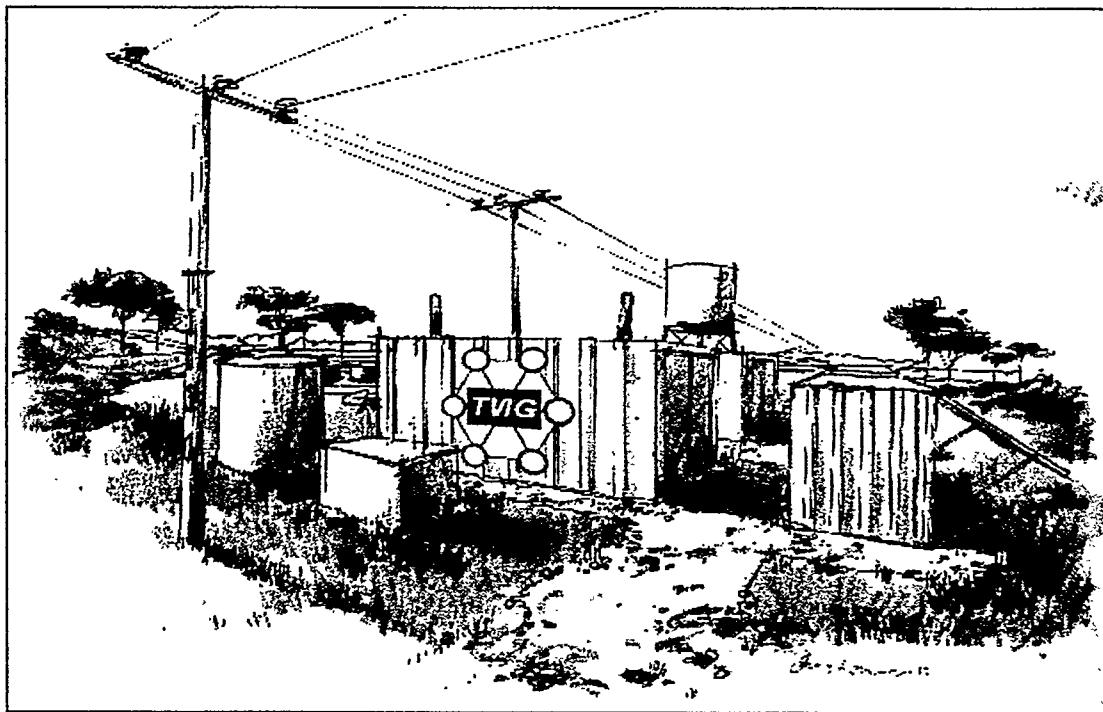
Option	Equity/Capital Cost	Year One Return	Year One Revenue	Year One Fuel Cost
Diesels Only	\$300K/\$1.2 m	\$306K	\$1.4 million	\$752K
Diesels & 1 Wind	\$375K/\$1.5m	\$421K	\$1.4 million	\$589K
Diesels & 2 Winds	\$475K/\$1.9m	\$535K	\$1.4 million	\$429K

Utila and TVIG wish to move the project ahead on the fastest schedule possible. During the project development phase, IPI and TVIG will assist the Utila investors in preparing a business plan and obtaining debt financing for the unit. This phase will take one to two months to accomplish. Once the main contract is signed procurement and construction of the diesels, water purification and distribution system expansion will begin immediately. Construction and testing of the core unit (all except the wind turbines) will require four to five months to complete. The core unit can be installed and operating by November 2000, and the electrical distribution system expansion should be in service before the tie-in of the IIP diesels. The procurement of the wind turbines, if selected, will be preceded by several months of data gathering from a meteorological tower prior to the final decision on the turbines' size and location.

Morehouse College International Power Institute

**and
Tennessee Valley Infrastructure Group, Inc.
for**

El Paraiso, Honduras



Preliminary Report

April, 2000

Morehouse College International Power Institute

Site Description Paper

El Paraiso, Honduras

February 2000

Town Description:

El Paraiso is a coastal town of about 2,000 on the main paved road between the tourist attraction of Fort Omoa and the bustling Puerto Cortez. The unit should be designed for the investor with the goals of selling power to the grid and producing the maximum amount of water possible for export to the Cayman Islands.

Potential Investors:

Enrique Morales (member of Grupo ECOLASA)

Involved Parties:

Jack Arrevalo, Congressman, Honduran Legislature

Key Site Contacts:

Enrique Morales, Investor

Current Infrastructure System:

Power:

The town is currently connected to the grid. The nearest generation facility, a 65 MW thermal (bunker) plant is approximately 75 km the site and is owned and operated by Ecolasa. Currently there exists an 8 to 9 MW power deficit, and ENEE, the national utility is purchasing power in the region to supply San Pedro Sula and the significant industrial activity in the region.

The potential investor for the project would like to utilize the stream, which flows through his property for energy generation. The stream flows directly past the potential unit site (see attached hydro study) at a rate of $2m^3$ per second and the entire watershed is privately owned and is in excellent conditions. There are two ideal sites for small dams with the capacity to produce between 500 kW and 800 kW nearly continuously, even during the dry season.

The client is looking for a production cost of \$0.05 per kWh, to be sold to ENEE at \$0.66 per kWh (marginal cost at which they must purchase electricity). Worth mentioning is that the investor is able to obtain high quality pen stock at or below market price, as he is the largest manufacturer and distributor of high quality piping in Honduras.

Water:

The client wants to sell "spring water" in bottles to the Grand Cayman Islands. Consequently he is most interested in R/O technology versus waste heat, although he is interested in the distilled water and ice markets, as well.

Furthermore, he is interested in taking advantage of attractive co-generation tax breaks available to co-generation projects.

Wastewater Treatment Systems:

None in town, nor is the investor interested in wastewater issues.

Roads:

Main road is paved

System Options:

Design should include:

- Diesel/Micro-hydro Hybrid
- Maximum water - R/O or Waste Heat
- Design should include waste heat ice machine

Option I: Micro-hydro Only

80 kW Micro-Hydro Turbine
R/O Water Unit w/ UV and Bottler

The micro-hydro potential is interesting. Rather than install a larger turbine, a small 80 kW turbine could be used without radically affecting the flow of the river. With a fall of 50 m and a flow of only 0.20 m³/sec and a 65 percent efficiency factor, the micro turbine could produce approximately 450,000 kWh. The estimated cost for this project is approximately \$600 /kW installed, plus approximately \$400/kW for civil engineering works. The total cost of the project would approach \$80,000. Given that ENEE will pay \$0.066/kWh, the micro-turbine would generate approximately \$29,700 per year. Since operation and maintenance costs are low, the project would recuperate its cost in approximately 3.5 years. Furthermore, as a renewable energy source, any profits generated by the project would be tax-free for five years. Considering that the useful life of such turbines is nearly 30 years, this becomes a very interesting project.

Option II: Small-hydro Only

800 kW Hydro Turbine
R/O Water Unit
Bottling Line

This opportunity enables the unit to generate the maximum amount of energy while taking advantage of various Honduran incentives for renewable energy sources, and at the same time allowing for reduced energy prices to the water bottling facility. The bottling facility can be co-located with the turbine installation, thereby reducing construction costs.

The total project cost for Option II is \$882,000, with projected annual revenue of a \$500,000 with reduced water sales due to the loss of high-value distilled water produced with waste heat. Other configurations could include more sophisticated (and more costly) high-volume R/O or electrically operated distillation units. Even so, with the current return, there is an excellent return on investment and a three-year project cost recuperation horizon.

Option III: Hydro/Diesel Combination

2 x 680 Diesel Generators

800 kW Small-Hydro Turbine

R/O Water Unit

Waste Heat Water Unit

This option allows for the reliability of a hybrid system, as well as the opportunity to derive profit-generating products utilizing waste heat. While the prime product of the installation continues to be bottled water for export, distilled water has a higher per/gallon price, and is in great demand in San Pedro Sula's industrial plants. Drinking water sells for the equivalent of \$0.20 per gallon in large bottles, and is exported at a price of \$0.70 per liter. Distilled water currently sells for \$0.50 per gallon, with minimal packaging or transport cost.

The total project cost for Option III is \$1,432,356. Total annual revenues are approximately \$ 4.3 million of which approximately 80 percent (\$ 3.4 million) is revenue from water sales.

Site Considerations:

The proposed small hydroelectric dam would be placed on the stream Piedra Mucle, located entirely within the property of the prime investor. One option is to construct a small weir, or take advantage of an existing weir measuring one meter in height located at an elevation of approximately 110 m above sea level (90 m above the generator house), some 450 m above an existing waterfall. This particular site was chosen for its narrow nature and slope of approximately 10 percent or greater.

The Watershed:

The watershed has an area of approximately 4 sq. km and is covered with dense tropical vegetation. Furthermore, the watershed is elongated with a south to north orientation, capturing moisture from sea breezes and the tradewinds.

Rainfall is approximately 1800 mm per year. October and November are the months with highest rainfall while April and May are the driest.

Environmental Considerations:

The stream is an eco-tourism destination, and should therefore be altered as little as possible. The investor owns the entire watershed.

Outstanding Questions:

Permitting issues for the power generation – site permits, fuel tax exemptions, power purchase agreements and impact assessments are all easily done by the investor through his technical team at the 65 MW ECOLASA installation.

However, market professionals as part of a true project assessment must conduct analysis and investigation of water issues.

