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COSTA RICAN CONVENTIONAL ENERGY PROJECT

Evaluation Report on Costa Rican Segment of Conventional Energy Technical Assistance Project (936-5724)

Evaluation by:

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TABLE OF CONTENTS

COSTA RICA CONVENTIONAL ENERGY PROJECT

NATURE OF THIS INTERIM EVALUATION REPORT

This is a draft report on the Costa Rican Conventional Energy Project (936-5724) in support of the parastatal petroleum organization, RECOPE, in its assessment and exploration of Costa Rican coal resources. This report is part of the final report of the Conventional Energy Assistance project, which also includes Pakistan, the Philippines, and Morocco.

GOAL OF THE CONVENTIONAL ENERGY EVALUATION REPORT

This Conventional Energy Evaluation is carried out under contract LAC-0000-C-4085-00 between AID and Georgetown University. It is designed as an evaluation of the existing CONVENTIONAL ENERGY TECHNICAL ASSISTANCE PROJECT (936-5724) of AID S&T/EY, including how it was developed and managed and what lessons were learned to apply to future project implementation.

First, a capsule project history is given and then the procedures carried out by the investigating team are outlined below. Following that, in line with the statement of work, the project rationale and procurement are investigated, project redirections and impacts are evaluated, and generic lessons are drawn for future conventional energy projects.

CAPSULE PROJECT HISTORY

The project supplied technical assistance by the United States Geological Survey (USGS) to RECOPE, based on a Memorandum of Understanding (MOU) between the Government of Costa Rica (GOCR) and USAID S&T/EY signed in February 1983. The purpose of the project was to assess the coal resources of Costa Rica in hitherto identified areas where preliminary studies and information were available. The request for assistance was initiated by Instituto Costarricense de Electricidad (ICE) in March 1981 and arose out of an interest in continuing the exploration in in the Atlantic Region of Costa Rica that had been launched with the assistance of the Japanese Government. In August 1982, there was a reorganization of energy activities in Costa Rica and RECOPE became responsible for coal exploration. With the assistance of USAID, which initially funded $750,000 worth of consulting services $350,000 to USGS and $400,000 Bechtel), later reduced to a total of $570,000 ($450,000 USGS and $120,000 for the exploitation feasibility study), RECOPE began a three year coal exploration program. Owing to delays, the work plan between USGS and RECOPE originally scheduled to commence in March was not agreed to until May 1983. The work schedule had to be delayed accordingly. Out of a total of seven sites across the country, USGS technical assistance has been allocated the prefeasibility exploration of two sites (Venado and Zent) and the feasibility stage of exploration and drilling at Valle de la Estrella, a section of the Watsi site (previously known as Volio). RECOPE, for its part has also contributed a total of 84

million colones (2.1 million dollars) from 1983-85, with a request of 120 million colones (3 million dollars) for FY86, in order to intensify its efforts in the area of coal exploration in these and other sites. Currently, the Valle de la Estrella finds are ripe for the second stage of the project; namely the evaluation of the depcsits' exploitability with a broadly-defined cost/benefit analysis.

Training of Costa Rican personnel has taken place in the United States (Kenneth Bolanos on use of exploratory drilling for coal resources assessment purposes), and in Costa Rica (geological, chemical analysis, and technical training by USGS personnel) both in classrooms and in the field.

METHODOLOGY OF THE INVESTIGATING TEAM

An evaluator, Adela Maria Bolet, Research Associate of the Energy and Strategic Resources Program of the Center for Strategic and International Studies whc is fluent in Spanish, carried out the evaluation by examing project documents and thorough interviews with AID and USGS staff, staff of other multilateral donors, and two days of interviews in Costa Rica with the RECOPE, ICE and GOCR officials, as well as members of the business community.

Documents reviewed included AID and USGS project papers, memoranda, and correspondence; a Prefeasibility Study Report by the Japan International Cooperation Agency (JICA); IBRD, IDB and OAS documents and studies; documents, corrrespondence, legislation and studies from Costa Rican sources.

AID personnel interviewed in Washingtokn included Alberto

Sabadell and Charles Bliss. AID staff member in Costa Rica interviewed was Heriberto Rodriquez. In Costa Rica RECOPE staff interviewed included Olderman[9] Bud Bergin of USGS. Others interviewed were Luis Cosenza and Bernardo Grossling of IDB and Eric Greenwood, and Gabriel Sauchez-Sierra of the World Bank. James Houle, Project Director at Bechtel was also interviewed.

PROJECT EVALUATION

This evaluation consists of three parts, namely (1) project rationale and procurement, (2) project realization -- redirection and impacts and, (3) generic lessons.

In this following discussion the processes of (a) country selection, (b) project selection, (c) relation to S&T/EY goals and (d) procurement procedures are investigated.

(a) Country Selection

The reasons for the selection of Costa Rica as a recipient of USAID conventional energy assistance become evident upon analysis of Costa Rica's dependence on petroleum imports. Costa Rica imports all the oil it consumes. In 1973, Costa Rica's oil bill totalled $19.8 million, which represented 4.35% of its total imports and 5.7% of its total export earnings. By 1980, the value of imports of crude oil and petroleum products rose to a high of 22.9% of export earnings. The latest figures available for 1983 show that ratio down to 19.02% representing 20.8% of its export earnings and a substantial oil bill of $164.1 million. (Figures derived from "Problems of Energy Supply," by Jorge Monge, May 1985, and "Costa Rica: Issues and Options in The Energy Sector" UNDP/IBRD, January, 1984.) Costa Rica has, as of

this writing no national exploitation of oil, natural gas or coal. Given that Costa Rica's development requires the use of local energy sources to substitute for imported oil and that the country has the administrative capability to assume responsibility for national energy development, Costa Rica was chosen for AID assistance in its efforts toward energy self-reliance.

(b) Project Selection

Since mid-1980, and specifically during the visit of J. D. Westfield of Development Sciences, Inc., on January 21-23, 1981 ICE expressed interest in receiving technical assistance in conventional energy sources, including coal exploration. ICE sent a written request for assistance in March 1981 to carry out the following:

Stage one: Completion of the reconnaissance study of coal resources to define priority areas for further study.

Stage two: Detailed evaluation of the coal deposits to determine their qualitative and quantitative characteristics and to define the pre-feasibility of exploitation.

This USG mission was only one of a number of technical missions including one by JICA. The GOCR, having deliberated over the analyses reports by these missions, signed an agreement with the Japanese government in March, 1981.

JICA sent a seven-member technical mission to conduct field investigations of the Baja Talamanca area (140 km) including, topographic mapping and a surface geological survey. A further task was to pass on the Japanese methods and techniques to their

Costa Rican counterparts. The Survey concluded that the coal seams found in this area had poor occurrence and only in the Volio (Watsi) areas were the seams thick enough to justify mining on a small scale. The quality of the coal samples averaged 12% moisture content, 19-25% ash content, and 4,500-5,000 kcal/kg in calorific value. In the five areas surveyed according to the Japanese method of classification, a total of $2 \times 10_6$ MT total reserves were indicated. Since these results proved rather modest and, according to some correspondents, the interests of the GOJ were pinned on the possibilities of an export market for Costa Rican coal, the Japanese ended their technical assistance to the project.

Meanwhile, the GOCR had witnessed an internal restructuring of responsibilities of energy planning, evaluation and investment. Most relevant here is the change in responsibility for coal exploration and resource assessment from ICE, a long-standing, experienced electric utility company with its greatest expertise in hydroelectricity, to RECOPE the autonomous petroleum refinery and supplier of petroleum products to the retail market. In the restructuring, RECOPE assumed responsibility for oil and gas exploration and drilling, with technical assistance from Petroleos Mexicanos - PEMEX.

This change of administration brought the geologists and project managers over to RECOPE, and signaled a vertical integration and rationalization of energy planning in Costa Rica. According to the Vice-Minister of Energy, there was an excessively slow reaction to the energy crisis in Costa Rica, indicating a lack of vision and experience. Fundamental

objectives in correcting the situation were not adjusted until institutional measures were taken to integrate the vital task of coordinating the opinions and options presented by each of the organizations responsible for the energy sub-sectors.

The focus of the Costa Rican energy sector thus became (1) the development of national energy resources, (2) substitution of imported petroleum, (3) improved efficiency of energy consumption, and (4) improvement of energy market mechanisms. The request for AID assistance for the assessment and evaluation of Costa Rica's coal resources was fundamental in meeting the first two ofthese objectives.

(d) Mode of Procurement

The work procurement for the Costa Rican coal evaluation was arranged under a Resources Support Services Agreement (RSSA) between the Department of the Interior's Geological Services and USAID's Conventional Energy Assistance Program. The mechanisms for such an agreement allow for the supply of expertise for world-wide availability to do certain tasks as they are assigned. USGS was assigned the tasks outlined in the work plan and performed them accordingly. There was a purposeful flexibility built into the project which allowed USGS personnel to be in residence in the field for as brief periods of time as were necessary to perform the tasks assigned, according to a schedule of work agreed upon both by the Costa Ricans at RECOPE and the USGS Team Leader. This mode of cooperation worked out well for several reasons:

(1) The relative geographic proximity of Costa Rica

allowed for repeated inexpensive short trips by USGS personnel.

(2) The lack of constant USGS personnel presence and/or supervision allowed the Costa Ricans a certain sense of independence, some breathing room, so to speak, and increased confidence in their management and technical abilities.

(3) From the USGS perspective, this did not unduly tie up personnel over extended periods, except as required for the fulfillment of the agreement.

(4) Finally, the implementation of the coal evaluation program was thus provided with greater flexibility whenever technical or equipment delivery delays took place. Both Costa Rica and USGS used their personnel and other resources with maximium effectiveness.

The procurement for the second phase of the project was originally accorded to Bechtel Corporation under the multi-year multi-country project between Bechtel and USAID known as Technical Assistance in Conventional Energy. The contract was signed in October, 1981 for a period of three years and then extended until September 30, 1985. Bechtel sent a representative on the problem identification mission, Dirk Liessen, who drafted the section of the work plan intended for Bechtel implementation. The tasking foreseen in the original work plan was a broad-range analysis of a coal system for Costa Rica from mine to end-user including transportation and infrastructural needs. The level of effort was for 90 man-weeks to be conducted during FY84.

Despite the delays of the first phase of the project, Bechtel brought the project to the point where the mining-engineering and economic analysis could begin with the geological

information then existent.Nevertheless yet USAID chose not to contact Bechtel to fulfill the contract. The reasons are basically two-fold. On the one hand, there was a budgetary cutback in the AID Conventional Energy Assistance program that dictated a review of priorities and funding levels of the project's components across the board. The budgetary allocation changes and their effects are discussed under that heading in this evaluation. On the other hand, there was a lack of enthusiasm on the part of AID/Washington about looking at coal use in general in Costa Rica. It wasbelieved that the uses of coal in industry in individual plants were probably not economically justifiable because conversion costs from bunker fuel to coal would be expensive and the coal transportation infrastructure was inadequate. The scope of work was also viewed as too broad, and "blown enormously out of proportion", to quote one senior AID official. At the point when the budget allocations were reduced, the scope of work was similarly scaled back to evaluate the mining engineering feasibility of the Volio area and a cost/benefit analysis of a mine-mouth power plant in accordance with ICE's stated interest. Finally, the reconstituted project was also to evaluate the conversion of cement plant conversion to coal as a prototype for other industrial conversions. Document 0036M of September 26, 1984, outlines these changes and provides fora $120,000 budget to be allocated for the coal production and utilization study to "an engineering firm qualified to perform the above described work."

Bechtel's contract expired September 30, 1985, and cannot

conduct the work beyond that date. RFPs have been put out, and proposals received and a contracting decision by AID/Washington to be made by September, 1985.

2. Project Realization: Redirection and Impacts

From January 24 to February 11, 1983, a problem identification mission consisting of Alberto Sabadell of USAID/Washington, Edwin R. Landis of USGS and Dirk R. Lijesen of Bechtel, travelled to Cost Rica. Discussions with USAID/CR GOCR officials, private enterprise and technical institutions were arranged by the counterpart team consisting of Oldemar Ramirez, Luis Malavassi and Kenneth Bolanos of RECOPE.

Based on the mission's findings, a work plan was drawn up whose objectives were: the evaluation of the country's resource potential; prototype coal development (mining) for a specific area; analysis of coal transport and distribution; projections for coal utilization in Costa Rica, and formulation of a coal system.

The technical training of Costa Rican professionals was the central focus of the project and its most important goal. It was expected that the technical training component of the project would enable the Costa Ricans to continue their coal resource evaluation beyond the time-frame of U.S. assistance.

The original scope of work was divided into five projects, the first two, coal exploration and prototype coal development in Baja Talamanca were to be conducted by the USGS and the other three, a study of coal transport and distribution, coal utilization and coal system development in Costa Rica.

This evaluation reviews the work of the first two projects conducted by USGS. The second phase is scheduled for this fall under open bids to a contractor yet to be determined. In the following sections, funding adequacy and modifications, task redirection and personnel problems, interagency interactions, and project impact on the host country are investigated.

(a) Funding Adequacy and Modifications

Under the capsule history above, the project funding changes were briefly outlined. Total USAID funding for the project with the initial broad-ranging scope of work totaled U.S. $750,000. The Costa Ricans contributed colones 20 million in FY 1984 (at January 1984 rates of 40 colones = $500,000); in FY 1985 the contribution increased three-fold to $60 million (at 1985 rates of 50 colones per dollar = $1.2 million); and the request for FY86 is an increased commitment of 120 million colones ($2.4 million). The scope of work as outlined in the Memorandum of Understanding of February 1983, allotted $350,000 of USAID funds for the USGS for the first phase of the project and $400,000 for Bechtel's completion of the second stage.

S&T/EY's budgetary cutbacks were reflected in cutbacks on Costa Rican assistance, for the reasons outlined earlier, and the total budget was reduced to a total of $570,000 with $450,000 going to USGS and $120,000 to the eventual contractor for the second phase.

Faced with these cutbacks, the project managers on both sides made a virtue out of necessity and allowed for great flexibility in the tasking implementation, according to the accessibility of funds and personnel. The following subsection

(b) describes this manpower management scheduling. In this evaluation's estimation, the funding for the first stage of the project was adequate. No misuse of funds/overbilling was detected. Financial reporting in the quarterly reports of Edwin Landis to USGS head of office in Reston, Virginia was adequate, and the expenditure projections for the subsequent quarter were duly outlined along with possible contingencies. Edwin Landis also kept the running totals of what remained in his budget.

There was concern expressed by Oldemar Ramirez of RECOPE and Heriberto Rodriguez of AID/CR that they were not fully informed of the budgetary cut-backs and the reasons for them, nor of the specific opening levels for a particular task on the part of USGS/Washington. Mr. Rodriguez complained of a lack of communication in that respect, even when requested, which he described as "unfortunate." That aspect of coordination had functioned badly. The project was initially based on the MOU between USAID and RECOPE. Each was assigned a scope of responsibilities. Then when the budget was changed in Washington, the AID Mission had no basis of comparison between the MOU and the revised budget/scope of work (memorandum

has never been determined whether there was sufficient or insufficient assistance. That would have given RECOPE the chance to determine its future needs and revise its work plans accordingly."

Similarly, RECOPE expressed apprehension that the rules would be changed once more for the implementation of the second phase of the project. There was uncertainty on RECOPE's part

as to whether USAID assistance would continue. No explanations or communications had been provided by AID Washington or Mission as to Bechtel's termination.

It was not clear to the evaluator whether the reason for this lack of communication was the "modus operandi" of centrally-managed programs or simply that certain types of information are passed on to the Mission and to host government agencies only on a "need to know" basis. It appears that, in this case at least, the information was not imminently sensitive. Its communication would have demonstrated a more forthcoming attitude on the part of AID/Washington without the unnecessary friction.

As to the decisions on budget reductions and the reduced scope of work for the second phase, it seems that a prefeasibility study of the type envisaged may not be sufficient for Costa Rican needs.

All the Costa Ricans interviewed agreed on one point: since the use of coal in Costa Rica for whatever purpose was totally unknown in the country, it was obvious that there was a great deal of uncertainty about its development as an energy resource. The outside consultant's assessment of the engineering, infrastructural, and economic costs of the use of coal at a national level are regarded as critical. No one in Costa Rica will make a political or investment decision without some concrete coal use scenarios, both for the medium and long-term.

(b) Task Redirection and Personnel Problems

The initiation of the project was delayed approximately three months, so many of the activities scheduled for USGS

personnel were postponed. Two Costa Rican geologists had been slated for training in the United States and only one was finally sent. Kenneth Bolanos spent six weeks of training with USGS personnel, both in the field and office. He described his training as very good, particularly the field drilling work which was directly relevant to his responsibilities in Costa Rica.

The training both in the field and in the classroom that Costa Rican personnel. was also rated very good by RECOPE personnel interviewed. The time spent by USGS personnel was also carefully managed in order to allow the meximum gain with the least expenditure of time and money in Costa Rica.

From RECOPE's perspective, the timing of USGS visits was important for the optimization of budget needs and for the maximum use of Costa Rican personnel. In other words, the request of USGS assistance was made in case of more specific problems and technical training. In addition, arrivals and departures of USGS personnel were timed to reduce per diem costs. The results of Costa Rican commitment, management, and fiscal control was very positive in terms of resource maximization.

Similarly, USGS was able to maximize the use of its personnel by limiting their visits to the periods of advising the Costa Ricans on how they should drill, how they should read their findings. In addition USGS provided training in some specialized procedures such as geophysical logging.

The USGS has loaned the Costa Ricans some equipment that the Costa Ricans have been encouraged to buy. Some of the equipment, however, is expensive ($25-50,000) and the foreign

exchange rate restrictions, and the required authorization of the National Bank of Costa Rica to follow through on such large purchases, lay at the root of a number of delays. These causes, therefore, can be considered beyond the control of the project managers. Nonetheless, given the circumstances, efforts were made to make a virtue out of necessity and to schedule the use of equipment and manpower on a flexible basis.

No major disagreements between USGS and RECOPE personnel were reported to this evaluator with the exception of a recent difference of technical opinion between Robert Hobbs and Kenneth Bolanos. Hobbs reportedly wrote a memorandum, which according to the Costa Ricans was "out of line." Bolanos and Ramirez have in turn written a memorandum for the record, stating the reasons for their position. When this turn of events was related to Mr. Sabadell in AID/Washington, there was a positive reaction to the incident in the sense that the Costa Ricans were able to assert themselves and stand on their convictions and experience.

On a similar vein, there was a certain conflict of interest between the USGS and the Costa Rican geologists. The latter wanted to concentrate on coal exploration with an eye towards eventual commercialization of the coal resource. USGS wanted more information on geological formations of Costa Rica, a more "academic" interest. The Costa Ricans prevailed in that no wells were drilled "just for the hell of it." Landis and the other USGS geologists and technicians were perceived as individuals of high quality, human warmth. "They came without imperatives, they have adopted easily," said Ramirez. The transfer of technology and know-how has been one of the most

successful aspects of this project and the result has been a greater confidence on the part of RECOPE personnel. For instance, in June 1985 a decision was made at the initiative of the Costa Ricans to drill 5 additional perforations of the second-phase drilling than had been planned for in that trimester's drilling schedule with USGS. Ramirez said, "We have responded with maximum capacity." RECOPE is thankful for the confidence that AID has placed upon it. This evaluator concludes that RECOPE has indeed met the challenge and that AID's confidence is well justified.

(c) Interagency Interaction

At the international level there are two other major donors that have varying perspectives on the Costa Rican energy sector in general and about the AID coal resources project in particular. These are the InterAmerican Development Bank (IDB) and the World Bank (IBRD). The IDB's Natural Resources Advisor, Bernardo Grossling, considers the coal project "well intentioned,." but believes that although coal may eventually replace some fuel oil and diesel, on balance it will have a minor impact. Grossling believes that while the exploration for petroleum and natural gas could have greater impact, this exploration is much less predictable, extremely capital intensive and thus poses major problems for a nation such as Costa Rica. Latin America, including Costa Rica, does not have the luxury of time to search for the "perfect" solution to its energy problems. It has the human resources and the market to adopt a more dynamic

model and to search less for "statist" solutions. Gossling believes that Costa Rica must attract foreign capital for oil and gas drilling as well as for coal exploration.

Both the World Bank and IBD have made loans to strengthen and expand the hydroelectric and geothermal sectors as well as to expand the electrical transmission system within Costa Rica and beyond its borders in Nicaragua, Honduras and, to Panama. These efforts at the electrical integration of Central America have continued despite political conflict. Costa Rica now exports up to 25% of its electricity to its neighbors. These arrangements however, have their limits. Other neighboring countries are also developing indigenous sources of energy, including electricity. Furthermore, Nicaragua pays about 30 percent of its electricity import bill in residual fuel oil delivered to Guanacaste and the balance in its own currency. This has caused significant cash-flow problems at ICE. Nevertheless, efforts should continue to be directed at regional resource maximization, and a turnaround of economic growth for the region.

The IBD has financed a major hydroelectric plant, Ventanas-Garita, whose completion has been postponed from 1985 to 1987, owing to the slack in demand for its power. The second project is the geothermal development of the Miravalles field, also financed by the IDB. The IDB has also financed 55 miles of grid extensions and joint technical assistance projects with United Nations Development Program (UNDP). The IBRD expresses grave doubts about the near-term economic feasibility of the development of Costa Rica's coal resources, given current alternative fuel prices.

Also the IBRD expressed environmental concerns about the acid runoffs from the Talamaca area into some of the coral reef coastline that is being developed for tourism.

The macro-economic perspective of these international institutions essentially argues that Costa Rica has a surplus of installed hydro and potential geothermal power, and that it needs to concentrate future investment on those resources in which it has experience. Coal development for mine-mouth electricity production is not taken very seriously; neither is coal production for bunker oil substitution in industry. Most of these arguments are based on the JICA study, which has now been superceded by RECOPE's work. In conclusion, the interaction of the IDB and IBRD analysts and personnel with the coal development project has been minimal. The opinions of these international lenders about the project are influential, however, and could seriously affect future commercialization of Costa Rican coal, because their funding will be required for whatever mode of exploitation is found to be most suitable. This evaluation would urge thorough briefing of both Banks' staff members of the concluding report of the Watsi finds, and Costa Rica's further exploration plans.

The interaction of Costa Rican institutions regarding the coal program is also critical to its success. The establishment of RECOPE as an autonomous entity with the ability of managing its own budget and relative independence from the Ministry of Energy and Mines (the Minister does not sit on RECOPE's board) has obviated a series of bureaucratic entanglements that may have

plagued the coal program had it remained under ICE management. Contracting for equipment and personnel and salary questions are handled with greater flexibility. In addition, RECOPE's parallel exploration program for petroleum and natural gas in tandem with coal, was, in the final analysis, a complementary effort.

The petroleum and gas exploration program assisted by PEMEX was started under RECOPE, and in 1981, three people from ICE, Oldemar Ramirez, Luis Malavasi and Kenneth Bolanos were transfered to RECOPE under Pedro Alfonso, manager for all exploration activities. At that time, the oil and gas program was going full force and RECOPE's resources were concentrated on that effort. Drilling equipment was bought for two wells that PEMEX had planned to drill in the Talamanca area. The geological survey work undertaken for this purpose had also confirmed the coal formations, and served to attract Japanese assistance for the coal prefeasibility study. The first well dug by PEMEX met with considerable delays and was dry. The San Jose well drilling program has been indefinitely suspended. The Costa Ricans thus faced the dilemma of how to attract the capital to continue an intensive drilling program required for eventual oil exploitation.

A statutory change was required in the national petroleum law under which the GOCR controlled its petroleum resources. The legal framework changed under the new Hydrocarbon Law, which will permit the maximum risk for exploration to be assumed by a foreign firm, given the fact that the GOCR does not have the resources necessary to continue such a program on its own.

The disappointment with PEMEX cooperation seemed to make the

modest investment required for coal development a more attractive proposition. According to the Mission respondent, if the petroleum program of RECOPE had not existed, the coal exploration program would have had many more delays. It would have to have started from scratch. Therefore, the first program served as a complement to the second.

Legally, there may eventually be some parallels also between the Hydrocarbons Legislation and an eventual privatization of the coal exploitation and mining industries. A change of investment climate may have to be undertaken. Current RECOPE policy is to reinvest 3 percent of its total sales in R&D, including coal exploration. If and when further investment seems appropriate, RECOPE will need to reassess its investment commitment in this sector to convince whatever type of foreign capital it may wish to attract that Costa Rica means serious business. Costa Rica must demonstrate that it has capable personnel, adequate infrastructure and that the GOCR can work with foreign firms. A change in the current limitations of foreign investment in this sector may not be sufficient guarantee.

Another important institution just recently developed in Costa Rica with The World Bank and UNDP technical assistance is the Directorio Sectoral de Energia (DSE) or Sectoral Energy Directorate, which is the energy plannning and energy information-gathering organization for the entire country. Its interest in the coal exploration project is limited to the degree coal may serve as a substitute for imported oil, and the potential uses of the coal resource in the future. It also plays

a coordinating role with AID, although, logically, the execution of the project is RECOPE's responsibility.

Eight of the DSE analysts are RECOPE employees, so that the degree of communication is a constant feed-back process. RECOPE's concrete results in the matter of proven reserves for Talamanca are very recent. DSE is nonetheless interested in exploring its possible uses. The dilemma lies in the fact that the country's energy infrastructure is geared towards the transport of petrochemicals. From the planning perspective, this has enormous logistical implications. On the other hand, ICE might be able to use the baseload power of a mine-mouth power plant, but it is and will continue to be so strapped for cash that it may not be able to make an investment of that magnitude until the 1990s. At that point, ICE would need to compare the coal plant investment with the Kwh costs of its next slated project, which is a geothermal plant. Depending on the coal survey results, certain planning scenarios until the year 2005 could be developed by DSE that would account for a certain subtitution of bunker fuel by coal. The results of the second phase of the pre-feasibility economic study funded by AID are critical to the development of said scenarios. Further, the national assessment of resources, and not only an exclusive concentration on Watsi or the more advanced fields is necessary because long-term planning requires the development of a national coal supply system with detailed cost projections.

It appears, therefore, that inspite of the relatively brief time that the energy ministry and the planning directorate have been in existence, their institutional ability is quite

significant, and their communication with the organisms comprising the energy sector is excellent, taking RECOPE as an example. Every one is acutely aware of the financial bottlenecks that especially plague the energy sector, and any strategic investment plan will most assuredly include various contingencies. No one can afford an investment mistake in Costa Rica, least of all the debt-ridden energy sector.

(d) Impact on Development.

The most significant impact that the coal evaluation project has had on Costa Rica has been the quality and success of transfer of technology and know-how to Costa Rican personnel. This has established sufficient confidence among the Costa Rican geologists that they were able to determine the resource evaluation system that was most appropriate for their country. The participation of USGS personnel was of high technical quality and they made great efforts to adapt to the Costa Rican environment language included. This form of assistance, therefore, may be held up as an example of a well-run and well-managed transfer of technology program.

RECOPE's strengthened commitment to the coal resource development is also a signal that, institutionally, the coal program is being taken more seriously, more than just as a marginal effort. Coal's potential as a fuel was almost totally unknown in Costa Rica a few years ago. Currently, because of the coal resource evaluation project's efforts, there will be increased awareness of this energy source, which will be

significant in developmental terms.

The institution-building aspects of this project are complementary to the institution-building efforts of UNDP/IBRD assistance to the DSE and to AID assistance to RECOPE's renewable energy projects. The host of Costa Rican energy institutions will have the technical, analytical, and manpoer capabilities to develop the soundest investment program to assure Costa Rica's energy future.

Regionally, the coal resources program may also have technology transfer programs to some of its Central American neighbors. This will be discussed in further detail under paragraph (f) in the next section.

3. Generic Lessons.

The generic lessons of this project are evaluated in terms of the possible gaps or duplication of project data, the effectiveness of project type, the evaluation needs, the role of the private sector, replication potential and general conclusions.

(a) Data Gaps

AID and USGS Assistance to RECOPE's coal resource evaluation program was based on ICE investigations of the coal potential of Costa Rica as a possible energy supplement to hydroelectricity. The area of particular interest was in south eastern Costa Rica, where petroleum investigations had gone on for years, and where coal deposits had long been reported. For this reason, Japanese government assistance through JICA was concentrated in the

systematic geologic surveying of the Volio area.

Consequently, RECOPE work with USGS assistance has also concentrated most intensively in that area where the most data had been gathered. RECOPE's geologic surveying is continuing to Tablazo, Esparza, Puriscal and San Carlos; Venado and Zent are currently at the prefeasibility stage of exploration and Volio (Watsi) is at the feasibility stage, i.e. prepared for the engineering and economic exploitation assessment.

A number of years will pass before all the geological data of Costa Rica's coal resources has been thoroughly collected and analyzed. The Costa Ricans now have the technical capability to fill those data gaps.

(b) Effectiveness of the Type of Project for Energy Assistance.

The extrapolation on whether the exploration and exploitation of Costa Rica's coal resources will serve as an oil-import substitution mechanism within the Costa Rican economy would be useless speculation at this point in time. Theoretically speaking, coal could serve as a bunker fuel substitute in a number of Costa Rican industries, the cement industry being one of the most significant users. In that instance, it would have a direct substitution effect if the delivered price of coal is sufficiently cheaper than the delivered price of bunker.

A mine-mouth coal-fired power plant has also been foreseen as an eventual user of Costa Rican coal. Currently, 98 percent of Costa Rica's electricity is being met with hydroelectric

production. Depending on the growth scenarios for the Costa Rican economy over the next five years and derivatively, the growth scenarios for Costa Rican electricity consumption through the 1990s, there may be a need for some facilities to cover the summer (dry season) peaking loads. Costa Rica also possesses significant geothermal potential which has just begun to be exploited. In the past five years no oil-powered plants have had to be used for meeting peak loads because of the major economic contraction that took place during the 1978-83 economic crisis. Although demand for electricity is now expected to grow at a healthy 5-6 percent per annum, current capacity is more than sufficient to meet Costa Rica's needs for the next few years. An eventual economic assessment of the investment in a coal-fired plant would have to compare its costs with that of its alternative investment in a geothermal plant. In this instance, therefore, there would be no direct oil-import substition effect, but rather, an indirect effect of possibly reduced up-front investment costs. At this point, however, the regional and national economic, social, and environmental impacts should be thoroughly examined. In summation, the effectiveness of this type of project for energy assistance should be evaluated on a medium-to-long term basis, rather than an immediate oil-import substitution scheme.

(c) Need for an Evaluation.

The respondents that were questioned on this issue concurred that it was necessary along some point of the project to have an assessment of their work and progress from an impartial source,

using impartial criteria. Although none of the individuals directly involved in the project felt they had anything to hide, a certain trepidation was expressed that AID/Washington would use the evaluation to "change the rules of the game" for the second phase of the project.

The central question for an evaluation of this type is whether AID has followed a reasonable course of assistance to Costa Rica for the evaluation of its coal resources. The first phase of the project, as contracted to USGS has met with very favorable results, generally speaking. The funding reductions in the AID Energy Assistance Program that forced a revision in the scope of work for the second phase may have reduced the future possibilities for an eventual Costa Rican exploitation effort which is not in anyone's interest. The expiration of the Bechtel contract in September, may be a timely explanation for the search for another engineering contractor, possibly owing to Bechtel's spotty performance in other S&T/YE projects. Meanwhile, valuable time is being wasted in Costa Rica while the decisions as to the new engineering contractor are being carried out in Washington. Furthermore, the "pilot user" approach being adopted in the second phase of the study may not be sufficiently broad to assess all the other variables that will have to be accounted for as transformations in the Costa Rican energy sector's assimilation of coal use occur.

(d) The Role of the Private Sector.

The eventual end-use of coal by private industry is being seriously considered by RECOPE staff. There have been

significant efforts by Pedro Alfonso, RECOPE's Director of Exploration, to make known the potential availability of coal to a number of industries. Lists have been drawn up and contacts established with bunker-burning industries that might be interested in the coal-burning alternative. Direct involvement of the private cement firm Industria Nacional de Cemento, has been undertaken in a pilot demonstration of coal burning. Four years ago, the company had considered burning imported coal and the investment calculated by Jean-Pierre Raton to mill the coal in combination with other biomass fuels would run from $3 - $7 million. He recognizes that, internationally, the future of the cement industry, whose energy costs run at about 50 percent of total costs, lies with coal. He still expressed great uncertainty as to the feasibility of any mining operation and the cost-competitiveness of coal versus other fuels. If the price was right, however, he would be willing to take the risk of using 20,000 to 40,000 MT per year and burn from 60-80 percent coal fuel, given certain medium term price guarantees.

CODESA, the other large currently operating cement plant, is government owned. It is improbable that Volio coal could be used economically in the CODESA plant, owing to transportation costs. If coal is found in the Western side of the country, it might then be feasible to exploit it for CODESA.

Coal use in a mine-mouth power plant would remain under government control because ICE is a national electric company and they would own and operate that plant.

As far as attracting foreign capital to exploit and mine

Costa Rican coal, this is not permitted under current legislation. Coal is classified under the Mining Act as a strategic resource and it can, therefore, only be exploited by the government in the national interest. In conversations with the Vice-Minister of Energy, it was not ruled out that an eventual Coal Act, parallel to the Hydrocarbons Act recently approved, could be instituted to attract foreign capital to the exploitation of Costa Rican coal. He also stated that any investment that was foreseen for coal use by the public sector would have to be justified with 20 percent greater costs than those of investments for the private sector. That was his calculation of the cost of public sector inefficiencies. Only a few local construction-engineering firms would be involved (most of that technical expertise is to be found within ICE) and the most likely prospect for coal use, the mine-mouth power plant, would also be owned by ICE. In conclusion, the strengthening of the Costa Rican private sector through AID assistance to this project is, at best, marginal.

(f) Project Replication.

The possibility for project replication is one of the more promising implications of AID technical assistance to the Costa Rican coal evaluation project. At a recent meeting of Central American geologists, which Mr. Sabadell, of AID Washington, and Mr. Ramirez, of RECOPE both attended, the Panamanians expressed great interest in RECOPE's progress in coal exploration. The coal formation found in the Talamanca area extends, in fact, all the way into North Eastern Panama. Consequently, there was

interest on their part to initiate a technical training agreement with RECOPE to train and equip a Panamanian team of geologists and technicians to evaluate Panama's coal resources. The feasibility of technical transfer to other countries of the region is also being considered. AID should maintain close communications with the interested countries' Missions as to any developments in this regard for future project identification purposes.

(e) Conclusion

This type of technical assistance project met all of AID's criteria for a sound project with various degrees of immediacy. As a technology transfer and technical training project, it was fairly successful. There was a positive spirit of cooperation among the USGS and Costa Rican staff that allowed for high quality training. As an imported energy substitution project, immediate effects may be marginal, and many questions remain to be answered, not only in the second phase of this project, but also beyond the scope of AID assistance. The Costa Ricans hope for future specialized assistance from USGS or other U.S. firms on a consulting basis. AID/Washington does not foresee any such further assistance to Costa Rica, although Mission requests to the effect will be considered in due form.

With respect to the level and mode of assistance agreed to in the MOU between AID/Washington, and GOCR, it does not bode well to agree to a certain scope of work at an intergovernmental level and then to reduce funds for the crucial part of the project. It

is hoped that the firm chosen as the contractor for the second phase makes the most out of the funds available and has highly qualified expertise in coal systems development. The results of that study could influence Costa Rican energy sector investments for many years.