

1971

CAPITAL PROJECTS EFFECTIVENESS EVALUATION

POST EVALUATION OF COMPLETED CAPITAL PROJECTS

Electric Power Projects

Three Rural Electric Cooperatives in Costa Rica

Rural Electrification

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SECTION 1

1971

CAPITAL PROJECTS EFFECTIVENESS EVALUATION POST EVALUATION OF COMPLETED CAPITAL PROJECTS

Electric Power Projects

Three Rural Electric Cooperatives in Costa Rica

Pursuant to the program of Interregional AID/W Evaluation Studies under direction of Mr. C. William Kontos, initiated January 1971, there was included:

"7. Capital project evaluation. ENGR is now planning to evaluate several completed capital projects to determine their effectiveness in reaching planned project targets and the contribution to development goals."

L. M. Hale, ENGR, was designated director of this project.

The basic design of this project was finalized in an April 6, 1971, draft paper. In keeping with this a number of electric power projects throughout the world were considered. Owing to the shortness of time it was decided to select a project that would require minimum travel, which was literally self-contained and which would not be associated with extraneous projects. It was agreed with the LA Bureau, the Costa Rica Desk and Mission and other interested appropriate AID/W offices, that the loan for three rural electric cooperatives in Costa Rica would be the subject of the pilot study in the field of electric power. Frank Masson, Economist, and John Rixse, Engineer, were the team assigned.

After an initial period of accumulation of available data and consultation in Washington, Masson departed Washington, D.C., Saturday, May 1, and Rixse departed Washington, D.C., Sunday, May 9. Karl Koone of the Nicaragua Mission, who had been associated with these three rural electric cooperative projects during their formulative stage was made available and joined Masson and Rixse on Sunday, May 9, departing Costa Rica Friday, May 14. Masson departed Costa Rica Friday, May 14, and Rixse Saturday, May 15.

The basic division of responsibility was that Frank Masson concentrated on the economics, the market and the financial analysis, whereas John Rixse concentrated on engineering, construction & cooperative management. The two areas of responsibility came together in the area of management and power use development as well as in the area of ongoing technical assistance. Karl Koone was a tremendous asset because he knew the areas, the people, the projects and was able to first-hand relate what had been

before and what was now. Although this report is jointly prepared by Masson and Rixse, it includes the views and observations of Karl Koone.

The report is in two Sections - the first section of four parts is the evaluation report on the project; the second section is one part of internal use by A.I.D. in its over-all program on methodology of post evaluation.

Section 1

- Part I - Background and the Project
- Part II - Engineering, Construction and Management
- Part III - Economics, Markets & Financial Analysis
- Part IV - Observations and Conclusions Regarding the Project
- Appendices to Section 1

Section 2

- Part V - Observations and Recommendations Regarding the Process of Post Evaluation of Completed Capital Projects

Part I - Background and the Project

In March 1963 the rural electrification development program was initiated. On October 27, 1965, A.I.D. loan (No. 515-L-015) was signed covering:

"The loan provided for capacity in the electric systems to serve 14,315 consumers (over a ten year period) with \$3,300,000 of A.I.D. loan funds and \$818,000 of local funds.-----Additional capital for connecting the ultimate consumers will be met from working capital and Costa Rican resources as needed."

In April 1966 the Conditions Precedent were met and implementation commenced. The loan was to the National Bank of Costa Rica (BNCR) for three new rural electric cooperatives.

- * Los Santos based on San Marcos
- * San Carlos (initially called Tres Amigos) based on Ciudad Quesada
- * Guanacaste based on Santa Cruz
- * plus a transmission link to serve the San Carlos cooperative, to be built by I.C.E. (National Institute of Electricity)

Quoting from the loan paper are the following salient features:

- "2. AMOUNT OF LOAN: Not to exceed \$3,300,000
- 3. TOTAL COST OF PROJECT: \$4,074,000
 - Borrower's Contribution: \$ 818,000 (Equivalent)
 - A.I.D. Loan Request \$3,256,000*
 - \$4,074,000

*To consist of \$2,288,000 in foreign exchange costs and \$968,000 in local costs.

4. PURPOSE: To provide facilities for the distribution of electricity by member-owned cooperatives for domestic, agricultural, commercial and industrial uses, and to provide transmission of power to the cooperative organized in the Tres Amigos area."

(underlining added)

The loan was the result of Mission efforts supported by AID/W utilizing NRECA (National Rural Electric Cooperative Association). NRECA made the reconnaissance investigations, prepared the feasibility study and provided the basic data for the loan paper in accordance with its usual four phase method of operation through a task order under its umbrella contract with A.I.D. The records indicate an enthusiastic reception of rural electrification by the Mission, BNCR and I.C.E.

A significant difference in this project from all other rural electric cooperative projects up to that time was that in this instance the engineering was to be provided by I.C.E., while management development was to be provided by the Cooperative Department of the National Bank and NRECA under contract directly with the National Bank. This contract, funded by the subject loan, provided the services of one person, Mr. Gilbert Moon, who had responsibility for coordinating all the implementation stages, including design, field engineering, construction, procurement and initial management development. He was assisted in this management phase toward the end of the project by short-time TDY specialists from the U.S. provided by NRECA under its contract with the National Bank.

Although this loan was to provide facilities for three independent, widely separated rural electric cooperative systems, the loan treated them all in one lump, as is illustrated by the following quotation from the loan paper (page iii, second paragraph):

"The system will consist of a total of 502 miles of primary distribution line covering 775 square miles and 18 miles of transmission line plus two substations and related equipment and buildings. Capacity is available in the primary line for the 14,216 consumers scheduled to be served within the first ten years of operation."

Another innovation in this particular loan was the following provision, (page iii, third paragraph):

"Included in the loan is the cost of house wiring and also a meter, a cut-off switch, three drop lights and three outlets for each domestic consumer, all to be the property of the respective cooperatives. The cost per house is about \$20."

Generally, A.I.D. loans for rural electric cooperatives have not provided for house wiring (as a matter of fact during the field evaluation it was learned that major users had to provide their own interior wiring and only the small residential users were provided this facility).

The loan paper did not clearly identify whether or not all the money was to provide service to all of the 14,216 consumers scheduled for service in the first ten years. The project was not built on that basis of management of loan funds. As a matter of fact on page iv the first paragraph contains this statement:

"-----it is expected that 4000 additional farmers-will-join the cooperatives in the first ten years of operation."

The loan paper contains extensive comments as to what is to be accomplished by this loan. Some of these are explanatory in nature and may be only illustrative but provided the only basis for analysis which is discussed in the economic section. It is to be noted that the basic job was to provide facilities for the distribution of electricity. But in order to get a feel for the justification cited in the loan paper some of these are quoted in Appendix A. It is noted that some of these are of an economic nature, some engineering and others social; therefore, each quote is prefaced by one of these three words indicating the general category of functional purpose or benefit.

Part II - Engineering, Construction and Management

The final report on the project prepared by Mr. Moon was incomplete in terms of the condition at the time of energization June 1969. Based upon data accumulated from the cooperatives during the recent evaluation, the following tabulation represents based statistics as of energization - June 1969 - and the end of the latest full month's operating report - March 31, 1971.

ANALYSIS

Consumers & Energy Usage

Source: Extracted from various monthly and annual operating reports obtained directly from the individual cooperatives for month of energization and latest reporting month - an elapsed period of 21 months.

(* "Other" includes commercials, industrials and public use)

Consumer Classif.	As of June 30, 1969			As of March 31, 1970					
	No. of Cons.	Energy Sold KWH	Energy Sold/ Cons.	No. of Cons.	Incr. %	Energy Sold KWH	Incr. %	Energy Sold/ Cons.	Incr. %
<u>Guanacaste</u>									
Rurals	2138	71,042	33	2406	+ 12	126,042	+ 77	52	+ 58
Other *	328	171,424	523	394	+ 20	395,687	+231	1004	+192
Total	2466	242,466	98	2800	+ 14	521,729	+115	186	+190
<u>Los Santos (Feb 28, 1970)</u>									
Rurals Only				1841		80,900		44	
Other				379		255,962		678	
Total				2220		336,862			
<u>San Carlos</u>									
Rurals	741	23,300	31	1276	+ 72	63,670	+173	50	+ 61
Other *	118	65,800	558	290	+154	217,239	+ 61	749	+134
Total	859	89,100	104	1566	+ 82	280,909	+ 215	779	+172

The above figures are an interesting contrast to the following which is quoted from page 8 of the loan paper in Section IV Engineering Analysis.

"Description of Project. This project consists of the construction of electric distribution facilities required to furnish electric service to consumers in three areas of Costa Rica, and installation of a transmission line to bring power into one of those areas. The three systems will total 502 miles of 14.4/24.9 KV primary distribution line to serve about 9,900 consumers initially and an estimated total of about 14,000 consumers by the end of the first 10 years of operation. The transmission line will be 18 miles long between Naranjo and Ciudad Quesada and operate at 34.5 KV.

The Los Santos Cooperative will serve an area of approximately 235 square miles having a population of 43,500. There are 5,300 occupied homes in the area. Headquarters will be in San Marcos.

The Tres Amigos San Carlos Cooperative will serve an area of approximately 235 square miles having a population of 28,000 and 4,100 occupied homes. Headquarters will be in Ciudad Quesada.

The Guanacaste Cooperative will serve an area of 305 square miles having a population of 26,500 and 3,600 occupied homes. Headquarters will be in Santa Cruz."

It is interesting to note that the above provides for a total of 13,000 occupied homes in the area whereas the opening statement estimates 14,000 consumers by the end of the first ten years.

From an engineering point of view the three systems were extremely well designed. They are functioning with a minimum of difficulty and only occasional momentary outages caused primarily by lightning. Most outages on the San Carlos system have been occasioned by interruptions originating on I.C.E.'s system.

A review of the final report as well as the periodic reports clearly demonstrate that the systems were built within the funds available. The Costa Rican contractor had no previous experience with construction of rural electric facilities. Mr. Gil Moon thoroughly trained the contractor's crews as to how to build rural electric lines on a mass production basis. Performance was more than satisfactory. There is ample evidence of excellent supervision by Mr. Moon. The cooperatives have retained operating crews which are capable of making extensions and member service connections in keeping with the basic specification and high quality of original construction.

Materials at warehouses are well ordered, stocked, catalogued and a thorough-going system of issuance is in effect. Owing to a problem discussed later, there was an excess of dollars in the loan which the cooperatives used to buy a large supply of materials from outside of Central America. This has resulted in adequate material for building many kilometers of line except for conductor.

From the accounting, billing and office procedure standpoint the cooperatives are well established. Two of the three managers had extensive training in the States immediately prior to construction. The third, on Guanacaste, was hired about the time of energization and he has not had rural electric cooperative management training. The bookkeeping system, stores activity, billing systems and meter reading systems are above par for new rural electric cooperatives. By an increase in the number of consumers with the same work force these administrative costs could be considerably reduced on a per member basis. Crews in all locations are well trained and are used actively in member service extensions and the construction of primary lines on a modest basis. The most extensive construction of new primary line is now underway on the San Carlos system. Some engineering is being provided for the cooperatives by an occasional visit of an I.C.E. engineer. At one time the cooperatives had the service of an engineer who is now in the U.S. taking graduate training.

There is no evidence of any plan or activity in effect or contemplated for the required ongoing training and improvement of the managements of the systems with particular attention to manager training, line foremen and safety training, office management training, directors training, community relations, member relations and very importantly power use development.

Further, the cooperatives have no prospect of any additional funds from any source except new members for the addition of new member service extensions or the filling in of primary extensions to the existing system. At the moment such work is being accomplished by revenue being obtained in one or a combination of the following three methods:

- a. Use of materials on hand residual from the original construction.
- b. Purchase of shares by new members on a basis commensurate with their ability to pay but on a basis comparable to, but on a higher level, than that for the original members.
- c. Solicitation of "contributions-in and of construction" from all new members based upon the cost of the new construction and the judgement of the Board of Directors as to the ability of these new members to pay.

This is resulting in newer connections, paying for line construction, something which the original connections did not have to do, even though all members, both original and new, through their monthly power bills are paying for amortization of the original loan. This is an inequitable system of cooperative management.

A review of the frequent periodic reports by Mr. Moon discloses that a very interesting pattern evolved in the mutual relationships between USAID, NRECA, the cooperatives, the National Bank and I.C.E. All of this resulted in a minimum of a year's delay in getting started. This is the year extra that the project required for completion. But more interestingly,

it revealed something else. From an engineering standpoint, Mr. Moon and I.C.E. quickly arrived at a uniform and adequate set of standards and engineering specifications adaptable to the use of wood poles and to the practices in Costa Rica. A big delay occurred in the processing of requests for bids and award of bids for materials which ran afoul of bureaucratic process in both USAID and the National Bank. Once all concerned became fully aware of mutual responsibilities and the need for action, paper work began to flow.

Mr. Moon's reports are also revealing in that whenever there were major changes in Mission personnel a whole new ballgame developed. There were new interpretations placed upon the loan and implementation procedures by the newly responsible personnel. This resulted in delays and considerable diversion of Mr. Moon's effort from the project to the flow of paper.

Another problem during implementation was the matter of locale for use of dollar loan funds. At the time the loan was prepared it was anticipated, for example, the conductor would be obtained from the U.S. Subsequently, it became available from a U.S. subsidiary in El Salvador. This by Mission rules became a local cost. Hence the project developed a shortage of local currency and an excess of dollars. This happened on a number of items of material. This accounts for the fact that cooperatives now have a shortage in stock of conductors and an excess of other materials which were obtained from the States.

By and large measuring the implementation of these three systems against other rural electrification cooperatives, both in the U.S. and overseas, the implementation went extremely well, was done in a most competent manner, expeditiously and within funds available. There was no requirement for a supplemental. There should have been a better arrangement for the redistribution between dollars and local currency and the use of some dollars for local currency items to have resulted in a more balanced procurement of items.

As is noted in Part I (refer to page 3) of this draft) the NRECA project coordinator was under contract to BNCR. This contract was paid for out of loan funds. It became clear to us that the Costa Ricans were quite unhappy with such an arrangement. It appeared that the one man had to spread himself so thin that he was not able to give much attention to management development. We could tell that the Costa Ricans seemed to object or resent or were reluctant to have their loan pay for such high priced talent. At one point we sensed the Costa Ricans felt they could have done it alone. However, the records show that if Mr. Moon had not been there and really pushed the job it possibly would not have been done as effectively, efficiently, economically and within the funds available. He fulfilled all of the contract obligations which NRECA had to BNCR.

The greatest defect of this particular project is discussed in Part IV in Findings and Recommendations but should be cited here, namely, there

was no provision initially nor has any been made to date, to provide for the inevitable need for further training on a continuous basis of the management of these systems. Anyone who has worked with rural electrification cooperatives knows that construction of the systems is not the end purpose. This physical system is merely an instrument through which a unique type of institution, a cooperative, "can serve its members", as to how to effectively utilize the availability of electric power, to improve their standard of living, to improve their income, and to improve the economy of their rural area, all as part of an over-all rural, cultural and social development program. These essential characteristics of this particular type of institution mark it apart from the usual commercial electric utility concept which is that there is merely the offer of a product for sale to whoever wants to come and get it. The purpose of a rural electric cooperative is to offer a service not just a product.* This particular aspect in these three systems, as it has been in many other rural electric cooperatives financed by A.I.D., was sadly neglected. We find that the National Bank's Cooperative Division has no experience with rural electric cooperatives upon which it can operate and develop a suitable program to assist these cooperatives. It needs to obtain this assistance. If it is not provided, these cooperatives will not prove to be viable cooperatives. They will, instead, eventually prove to be merely another utility, eventually to be absorbed by I.C.E.

PART III - Economics, Markets & Financial Analysis

The Engineering Economic Feasibility Study^{1/} upon which the loan paper^{2/} is based provides proforma balance sheets and profit-and-loss statements for each proposed system. These documents form the focal points for a series of technical and financial assumptions internal to the operating entities, as well as for a number of economic trends external to these entities. What the P-&-L's projected was a rapid increase in operating revenues, which after six to eight years would be sufficient to offset the heavy weight of additions to reserves for depreciation and the cost of debt service. These projections are thus extremely sensitive to the rate of growth in operating revenues, which in turn is a function of both extension of systems and load factors. Otherwise, ceteris paribus, the net loss of each system would rapidly rise to levels far exceeding total operating revenues.

* Another essential characteristic is that rural electric cooperatives operate on a basis of area coverage with equal service to all on a common and equitable basis of contribution and benefits both to initial and all subsequent members.

^{1/}Glenn R. Benjamin: "Phase III Report, Engineering Economic Feasibility Study of Three Pilot Electric Cooperative Guanacaste, Tres Amigos (San Carlos) and Los Santos" NRECA-USAID Contract, November 11, 1964.

^{2/}Agency for International Development: Capital Assistance Paper -- Costa Rica: Rural Electrification Loan -- June 14, 1965. Authorized as AID Loan 515-L-015 on June 24, 1965.

Table I contrasts the projections for P-&-L's with what can be abstracted from the published accounting records of the three cooperatives. It should be borne in mind that not only the physical facilities of the entities have been developing during the period under review (roughly, since mid-1969), but also the accounting systems themselves. Los Santos has prepared only one P-&-L during this period. There is some doubt as to the amounts shown for depreciation during the first year (Guanacaste shows nothing); the accounting periods vary from a year to eighteen months for the first period; reserves for bad debts are in some cases lumped under interest; etc. For these and other technical reasons, and also because of the short historical period involved, it did not appear useful to attempt an analysis of balance sheets.

During the first two years of operation, with the possible exception of the Los Santos system, net losses have, in fact, been much less than anticipated. This fact, however, is of little significance in view of the fact that both Los Santos and San Carlos are currently far below the level of sales revenue projected for them. Guanacaste has had unexpected sales of energy for industrial use and street lighting, thereby suggesting a much better overall performance than the other two systems. But this initial advantage (resulting largely from failure to take into account the large energy requirements of the El Viejo sugar mill) could be wiped out by either a planned increase in the mill's ability to produce peak power for the harvest season, or a failure for demand by other industrial users to materialize.

Projections for industrial use in the Los Santos system, on the other hand, apparently did take into account its major user, San Cristobal S.A. (La Lucha) which currently consumes 38% of its total sales in Kwh. In addition, San Cristobal generates about 900 KW from its own plants (both hydro and diesel) and reports that its planning is far advanced for building a 5000 KW hydro plant near Bustamante. This would supplant all purchases by the firm from the Los Santos system; and would provide a sizeable excess which might be sold to the coop. Although some doubts exist concerning the engineering and economic feasibility of this addition to generating capacity, its realization could have far-reaching effects on Coopesantos. While this power might not be available on a firm basis, it would be available at extremely low cost (a price of 8 mills/kwh was mentioned by the manager of Coopesantos). In conclusion, the vagaries introduced by possible transitions from self-generated to coop-purchased power are present in all systems. These doubtless account for many of the discrepancies between projections and accomplishments to date, and would make projections at this time rather iffy.

a) Household Use

From the point of view of the level and growth of demand, however, none of the systems are in a particularly favorable situation. Residential sales are all below forecasts, ranging from 61% in San Carlos, to 50% in

Los Santos, to 6% in Guanacaste. In all three systems, the proportion of customers using only the minimum consumption (20 kwh/month) exceeds 50%. In Los Santos, at least, this proportion has shown a tendency to rise over time and is now 54%, the same as in Guanacaste.

The conventional wisdom holds that this phenomenon results from a vicious circle between relatively expensive electrical energy and the reluctance of residential consumers to acquire more appliances. Contributing factors may include the low opportunity cost of time -- e.g., a low value placed on time-saving devices such as electric as an alternative to wood-burning stoves; or refrigeration as an alternative to numerous trips to stores. Other possible explanations do exist, however, such as insufficient knowledge of possible monetary economies to be derived from certain appliances, lack of purchasing power or credit terms to acquire them, etc.

These factors can never be broken down into a series of testable hypotheses in the absence of aggressive sales campaigns for appliances in the system areas, combined with a reduction in the cost of electricity. We have attempted to study current attitudes of members of two of the cooperatives (Los Santos and San Carlos) with regard to these matters, by survey methods. Time did not permit either the development and pre-testing of a fully satisfactory questionnaire, or the execution of an adequate sample selection. But the results of our survey do appear to hold sufficient interest to warrant reproduction (see table 2).

We note first (item 2) a rather low degree of awareness of the electric coops as a source of their power. A high proportion of respondents cited ICE rather than the local coop as the institution supplying their power. Other than household lighting, ownership of major appliances was extremely low (item 5). However, almost every household owned an electric iron. With the exception of commercial establishments, virtually no respondents had taken advantage of electric power tools or sewing machines to augment their incomes (item 6). Despite our inability to ascertain with any degree of accuracy the frequency of individual power failures, few respondents expressed dissatisfaction on this score (item 7). Although most respondents were aware of the higher price of electricity in the area served by the coops, a considerable number did rationalize this on the grounds that this was justified by the higher cost of providing the service (item 8). An overwhelming share of the respondents expressed no interest whatsoever in acquiring additional appliances (item 9) and none felt that their acquisition would add to their income (item 10). With a few exceptions, on the other hand, respondents indicated an interest in a program under which appliances could be acquired through the electric coops with a discount (item 11). The existence of variable farm income or sporadic employment made it difficult to elicit an accurate estimate of respondents' incomes. However, since total family income was not on the questionnaire, income may be severely under-stated. Nevertheless, it seems that a majority of the respondents in the Los Santos area earned over ₡500 monthly; and a somewhat smaller proportion, in the San Carlos area. A useful follow-on

question would have been the extent to which uncertainty as to future income deters families from buying major appliances. But a comparison of income levels with appliance ownership strongly suggests that market development potential does exist for these items.

Conversations with a dozen or so appliance dealers in the San Carlos and Guanacaste areas (the Los Santos area is served by several marketing centers and is, moreover, much closer to the capital city of San Jose) revealed very great increases in sales of electric irons and significant increases in selected other items, since 1968. One dealer in Guanacaste reported that 60-70% of his sales since September 1969 were in rural areas not previously served by electricity. But no dealer handled electric hot plates, and the consumers interviewed appeared to know nothing about them. In general, while the big-ticket items were on display, store owners appeared to lack a number of articles that could inexpensively serve consumer needs.

In sum, electricity has had relatively little effect on rural people served by the coops. Our survey suggests a grave deficiency with regard to overall education and direction from either private merchants or coop officials with regard to encouraging and developing new areas for use of electric power. Few people seem to have caught on to the fact that acquisition of power tools could both increase agricultural productivity and open up new avenues for increasing their purchasing power through development of artisan and cottage industry. It does appear, therefore, that an aggressive sales program would greatly expand power consumption in the area.

In discussing this point with coop officials and with members of their Boards of Directors, one was struck by both their reluctance to acknowledge the financial benefit for the coop to be achieved by increasing load factors, and their inability to articulate a credit-sales program which would achieve this result. Some hope was pinned on development of such a program by the national federation of cooperatives, which is a weak, under-financed entity, beset by organizational problems, reflecting a number of conflicting interests, among which those of the electric coops will doubtless be given a rather low priority for some time to come. It would seem that self-help in this regard must be exercised by the coops themselves.

b) Industrial use

The feasibility study lists a variety of industries that can be developed in each of the three areas with suitable rural electric systems. These are as follows:

Los Santos: Canneries for vegetable and fruit juices; decorticating mills; jam and preserve plants; feed mills; tobacco curing; charcoal plants; small foundries; small machine shops; quarries, crushers and sorters; crop dryers; and ice plants.

San Carlos: Pressed board; canneries, jam and preserve processing plants; wood pulp; feed mills; starch mills; copra and coir plants; chemical plants; charcoal plants; machine shops; cement blocks and other concrete products; crop dryers; and ice plants.

Guanacaste: Canneries for vegetables and fruits; jam and preserve plants; feed mills; charcoal plants; small foundries; small machine shops; tanning plants; manganese mining and milling; chemical plants (MgO_2); quarries, crushers and sorters; cement blocks; crop driers; and ice plants.

Actual results achieved to date fall far short of these possibilities. The industrial consumers of each coop are listed by type in table 3. Los Santos shows the highest level of industrial use, largely by supplying the traditional industries of the area (coffee processing; bags and twine) which had previously produced their own energy. A new line of plastic bags and twine has been introduced by the largest consumer of energy (La Lucha). But considerable dissatisfaction with the coop as a source of energy (e.g. drops in line voltage, etc.) was expressed by the management of the enterprise, which is now developing a new power plant for its own use, as discussed above. With the exception of rock crushing, none of the other possibilities listed above has materialized.

In contrast, many new businesses have been established in San Carlos, for some of which electricity is vital, specifically milk processing. It does seem strange that this possibility was overlooked by the feasibility study. Growth of the San Carlos Canton in which the coop operates is best illustrated by property tax collections -- \$500,000 in 1969, \$600,000 in 1970, and an estimated \$700,000 in 1971.

Guanacaste shows the highest rate of growth but the lowest absolute level of industrial use. As discussed above, this development is connected with one sugar mill whose future power needs cannot be determined with any degree of precision. With the exception of grain drying, none of the other industries listed above have so far materialized.

Perhaps the most outstanding shortfall in this regard is the apparent failure of artisan and cottage industry to materialize. The labor-intensive feature of this development has fallen far short of its potential. At the same time, little or nothing seems to have been attempted by the coops to attract large new firms into their areas. As in the case of development for household use, this area of cooperative management shows serious deficiencies. None of the organizations have professional, or even full-time public relations personnel. Some assistance in this regard has been provided by the Peace Corps, but with rather inconclusive results to date. At present, only the Los Santos coop has a volunteer assigned to it. The "Monthly Bulletins" distributed to coop members are generally of mediocre quality and appear to have had little effect as devices for stimulating either industrial or household consumption of electricity.

c) Street Lighting and Miscellaneous

In Guanacaste, some 13% of total sales are for street lighting in 39 communities. This type of sales represents only 3% and 2% in Los Santos and San Carlos, respectively, serving 27 communities, in the latter. One miscellaneous use of which special note should be taken is for adult education -- night schools have been introduced in the major population centers of each of the regions.

The time allowed for this evaluation was insufficient to obtain detailed analyses of sources and uses of financing of this project. This information was requested from the borrower, and may be incorporated in a subsequent version of this report. Data available are summarized in appendix C (see lower panel, "Actual sources and uses of financing").

ACKNOWLEDGEMENT

Preparation of this section of the report would have been quite impossible without the full-time collaboration of Mr. Jim Davis, who is investigating the rural electric coop system in Costa Rica under an independent study program for the Associated Colleges of the Midwest. Mr. Thomas Burns, Peace Corps Volunteer assigned to the Los Santos Coop, also participated in the field survey work in both the Los Santos and San Carlos areas. Many of the judgments expressed above are as much those of these investigators as those of the A.I.D. personnel who worked on this report.

PART IV - Observations and Conclusions Regarding the Projects

This project consisted of more than the average electric power capital project. It also dealt with a specific type of electric power project which is unique in A.I.D. experience, namely, it was concerned primarily with the construction of distribution system facilities. The other aspect was the institutional development and pioneering in the formation of a cooperative which is unique in the field of electric power but is not unique in the field of rural electrification as it is known in the U.S. experience. These two characteristics give rise to unique comments peculiar to this project and give rise to some of the deficiencies evident in this early stage of project life.

The overwhelming conclusion is that the cooperatives were not established on the basis that they would receive, nor are they receiving, the concentrated technical assistance which has generally been found necessary when initiating cooperative enterprise in the field of electric power. The criterion against which one measures is the fact that the rural electric cooperatives in the U.S. in a much more sophisticated climate were successful only because they continue to receive from the lending institution, the Rural Electrification Administration, a steady supporting assistance in the area of management training and development, power use development, accounting, engineering, construction and all of the unique features of

rural electric cooperative development. The absence of these in the Costa Rican situation is striking and already is beginning to show itself in terms of increasing number of minimum users rather than a decreasing number, an increasing tendency for newer members to pay more of their capital cost as well as to help amortize the original loan through their rates, the lack of power use development, -e.g., techniques and programs to encourage existing and proposed members of the cooperative to make effective use of electric power to improve their income, to improve their standards of living and to improve their vocational opportunities - and the absence of systematic training and development opportunities for all of the employees of the cooperatives and for the Board of Directors, as well as community and member relation programs. These were discussed at length at all of the systems, with I.C.E. and with the Cooperative Department of BNCR. There was a recognition of a need on the part of all of these people and a desire to have some guidance but a lack of experience upon which to build or base the necessary programs of action.

The three cooperative systems were very well designed, constructed and are being operated in an excellent manner. The billing process is more than adequate. The morale of the employees is high. In the San Carlos area there is a close cooperation between industry and the cooperative management and between the municipal system in Ciudad Quesada and the cooperative. These are very favorable situations.

Despite the fact that these systems have been completed for two years there apparently has been no effort on the part of the three cooperatives, I.C.E. or BNCR to seek additional capital funds to fill in with the construction of primary line and services to unserved members in the area of the existing primary lines nor to extend the primary lines in to adjacent areas. One might construe the recent I.C.E. application to and loan from IDB to serve an expanding area of the Guanacaste system as meeting this need but that is not the case. The loan which I.C.E. obtained from IDB really completes service to a portion of the Guanacaste province which was originally contemplated but which was not included in the A.I.D. loan. No funds were provided in the IDB loan for expanding service within the original cooperative area as covered by the A.I.D. loan. These points are noted because rural electric distribution systems operating on the principle of area coverage, as these presumably were, will require the consistent influx of new capital loan funds in order to provide for growth and for equity of contribution by both original and subsequent numbers. The concept that new members, after the original section, will have to pay more for their facilities is contrary to the basic premise of mutuality and equality inherent in rural electric cooperative systems.

The records in A.I.D. were not particularly good on these three systems of this rural electrification project. Lacking were monthly, and quarterly reports on the three systems, reports by various persons and organizations who have done evaluation studies of one kind or another, both before, during and after the systems were constructed, and knowledge that various persons

and organizations were at the time doing evaluations, e.g., Jim Davis, an undergraduate student participating in a study program of the Associated Colleges of the Midwest; and immediately prior to our evaluation, an on-site review by representatives from Guatamala Government and the U.S. A.I.D. Mission in Guatamala. Also missing was the record of a base line economic study done immediately prior to energization of the three systems by Galen Moses, as his Master's Thesis, University of Florida.

The feasibility study which was prepared by the NRECA personnel was voluminous but inaccurate as to economic and financial data and projections. The engineering and technical aspects were acceptable but the many assertions in the report for the purpose of supporting the project were overblown, misleading and inadequate.

Except for the above referenced report by Galen Moses which was not available to us initially, an economic base line was not established against which those cooperatives could be evaluated in terms of their impact on the area. At this point one should note the quotations in Appendix A from the loan paper. These are considerably milder when compared to the alleged benefits cited in the feasibility report, nevertheless concrete analysis of the before and after was almost impossible. Detailed discussion with system personnel in double checking the feasibility study and loan paper disclosed that apparently someone prepared the CAP who was not familiar with Spanish, hence there was an incorrect transfer of data from the feasibility study to the loan paper. This did not necessarily distort the importance of the recommendation of the loan paper but it did destroy the ability to check before and after data.

During the evaluation process it was very difficult to separate the evaluation from the development of recommendations and suggestions. On the other hand, personnel in the cooperatives, I.C.E. and BNCR were more interested in suggestions and recommendations than as they were in evaluation per se. This is mentioned again in Part V. But as long as this did occur, the following are offered as thoughts for future loan papers.

- 1) The IRR should lay the basis for negotiations with the host country's national government and/or the grantor of the loan concerning an agreement
 - a) to establish support and financing for an on-going institution independent of the rural electric cooperative systems to:
 - (1) concentrate on the economic development of the area to be served by the electric cooperative which development is basic to achievement of the goals of the CAP.
 - (2) concentrate on the utilization by members of the rural electric cooperatives, of electric power in a manner beneficial to their way of life, their economy and their standard of living.

- b) to agree with USAID and with the rural electric cooperatives, at the time of energization of the system, or at the time of substantially all loan disbursements, on the development of new base line economic conditions and projects to:
- (1) reflect the then existing conditions and
 - (2) establish additional steps needed to assure viability of the systems and the integrity of debt service payments.
- 2) Additional personnel should have been provided under the NRECA contract with BNCR (the borrower) to assist with cooperative management development during the construction stage and to provide for a continuing training or development program of cooperative employees, board of directors, managers and power use program. If BNCR and others did not wish to utilize NRECA, similar arrangements should have been made through consulting firms and/or individual consultants or specialists, either course of action which, although more difficult to arrange, might have been more appropriately provided for with salutary effects on an improved two years of operation.
- 3) Apparently the US A.I.D. Mission in Costa Rica lost sight of, interest in, concern about, or however you want to describe it, in the three rural electric cooperative systems. This is where the institutional development aspect should have picked up even though a grant might have been required. This was not done. As willing as the Costa Ricans were they did not have the background of experience in this particular type of institution on which to build a sound program. They still do not have it. They need it. If it is not provided these systems will eventually drift into becoming a part of the commercial power system of I.C.E. As an institution the experimental and pilot effort could become a dissipation of A.I.D.'s institution building and associated capital lending efforts.

It is increasingly clear, as we contemplate the findings in Costa Rica, that there should be a positive continuum of interest, expertise and responsibility from the development through the implementation stages of a project. What happened here was that Karl Koone was intimately involved in rural development and in the development of the rural electrification project. He left the Mission as implementation was about to begin. The project, as is noted in Part II, thereafter lacked this continuity of understanding and responsibility. As a matter of fact, in a project such as this which should have built into it an on-going technical assistance phase, there should have been this continuity on through the after completion date and on into the development phase.

Quotations from Loan Paper (see Pg. 7 of this report). The page references are to the loan paper.

ECONOMIC
p. ii
1st para.

".....a study was made to determine which areas had the greatest food-producing potential.....an intensive study was made to determine the potential for starting or expanding small rural industries."

ECONOMIC
p. ii
2nd para.

".....the areas selected will benefit from several existing development programs which will help bring about a comprehensive approach to their development.

SOCIAL
p. ii
3rd para.

".....intended to serve as models for other communities of Costa Rica,training sites for the personnel to be required in future rural electric cooperative projects within the country."

ECONOMIC
p. ii
3rd para.

".....distribution of adequate electric power throughout these rural areas will increase the efficiency of agricultural production and will promote the development and expansion of agricultural industries in addition to raising the living standards of slightly over 7% of the total national population."

ECONOMIC
p. iii
3rd para.

"Commercial or industrial users of electricity provided will pay for their wiring and related installations from the point of the meter."

ECONOMIC
p. iv
1st para.

".....it is expected that 4000 additional farmers will join the cooperatives in the first ten years of operation."

ECONOMIC
p. i
1st para.

".....Electricity will help make the currently less populous zones more attractive to permanent settlers and will help develop small industries for the employment and development of skilled labor in the less populous areas."

ECONOMIC
p. i
2nd para.

"The Guanacaste Electric Cooperative.....objective is to stimulate and accelerate the integral development of the area composed of five thousand square kilometers and 110,000 people."

ECONOMIC
p. i
3rd para.

".....the project will surely have a favorable impact on agricultural production.Guanacaste, will stimulate economic utilization of productive soils thereby displacing

ENGINEERING
p. 10
3rd para.

"Construction of the project is expected to be completed 30 months from the date of the loan agreement.....The three systems will be built concurrently as weather permits."

ENGINEERING.
p. 10
6th para.

"The source of power for the three systems will be the I.C.E. 34.5 KV transmission system. A 5000 KVA substation to supply the Los Santos system will be installed at La Lucha. A 18 mile 34.5 KV line will be built by I.C.E. between Naranjo and Ciudad Quesada to supply a 6000 KVA substation to be built near Ciudad Quesada for the Tres Amigos System. The Guanacaste system will be supplied temporarily from the existing 800 KW diesel generating plants in Santa Cruz. Additional power is expected to be available in the I.C.E. system in 1968 when the Cacho Hydroelectric project comes on the line."

ENGINEERING
p. 11
7th para.

".....I.C.E. and the National Bank will develop training courses for administrative and operating personnel early in the development stages of these cooperatives."

FINANCIAL PROJECTIONS: Three Electric Cooperatives (000 ₡)

Guanacaste:	Year 1			Year 2		
	<u>Projected</u>	<u>Actual</u>	<u>A/P</u>	<u>Projected</u>	<u>Actual</u>	<u>A/P</u>
<u>Revenue</u>						
Residential	423	436*	1.03	454	426	0.94
Street Lighting	38	353	9.29	62	138	2.23
Industrial	8	69	8.63	8	500	62.50
Other Income	-	-		-	-24	
Total	469	872	1.86	524	1,088	2.08
<u>Cost of Operation</u>						
Energy Purchased	250	487	1.94	279	632	2.26
Other Production Expense	190	415		195	205	
Depreciation	158	-		159	270	
Total	598	902	1.50	633	1,107	1.78
Profit before Interest	-129	-30		-109	-19	
Interest	100	58		100	60	
Net Profit	-229	-88		-209	-79	

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* Assumes all service in Santa Cruz prior to Jan. 1, 1969 was residential

Source: Projections: Engineering Economic Feasibility Study (11/11/64)
 Actual (1): Coopeguanacaste 6/12/68 to 12/31/69
 (2): Coopeguanacaste 1/1/70 to 12/31/70

FINANCIAL PROJECTIONS: Three Electric Cooperatives (000 ₡)

<u>San Carlos:</u>	<u>Year 1</u>			<u>Year 2</u>		
	<u>Projected</u>	<u>Actual</u>	<u>A/P</u>	<u>Projected</u>	<u>Actual</u>	<u>A/P</u>
<u>Revenue</u>						
Residential	467	NA		535	209	0.39
Street Lighting	43	NA		45	17	0.38
Industrial	565	NA		651	542	0.83
Other Income	-	1		-	24	
Total	1,075	148		1,231	792	0.64
<u>Cost of Operation</u>						
Energy Purchased	730	76	0.10	839	367	0.44
Other Production Expense	226	72		232	230	
Depreciation	252	68		253	220	
Total	1,208	216	0.17	1,324	817	0.61
Profit Before Interest	-133	-68		-93	-25	
Interest	161	-		162	70	
Net Profit	-294	-68		-255	-95	

Source: Projections: Engineering Economic Feasibility Study (11/11/64)

Actual: (1) Coopesca 10/1/68 to 9/30/69
(2) Coopesca 1/1/70 to 12/31/70

FINANCIAL PROJECTIONS: Three Electric Cooperatives (ooo \$)

<u>Los Santos:</u>	<u>Year 1</u>			<u>Year 2</u>	
	<u>Projected</u>	<u>Actual</u>	<u>A/P</u>	<u>Projected</u>	<u>Actual *</u>
<u>Revenue</u>					
Residential	822	413	0.50	884	
Street Lighting	57	22	0.39	60	
Industrial	278	283	1.02	317	
Other Income	-	113**		-	
<u>Total</u>	1,157	831	0.72	1,261	
<u>Cost of Operation</u>					
Energy Purchased	620	436	.70	685	
Other Production Expense	274	323		280	
Depreciation	353	309		354	
<u>Total</u>	1,247	1,068	.86	1,319	
Profit Before Interest	-90	-237		-58	
Interest	222	104		223	
Net Profit	-312	-341		-281	

Source: Projections: Engineering Economic Feasibility Study (11/11/64)

Actual: (1) Coopesantos 7/1/68 to 8/31/70

* No financial data. Second year of operation will terminate 8/31/71.

** Total revenue - [actual/projection] Discrepancy attributable to difference in period covered by the projection vs. actual. Other income during period was 31.

QUESTIONNAIRE RESULTS IN TWO COOPERATIVE ELECTRIC SYSTEMS

	<u>Los Santos Number</u>	<u>San Carlos Number</u>
(1) Number of Interviewees	43*	29*
(2) Stated source of electricity		
cooperative	24	12
other	18	17
(3) Monthly electricity bill		
minimum	17	16
minimum - \$ 9.95	7	3
\$ 10 and above	19	10
(4) Use of electricity		
domestic	37	20
commercial	7	7
industrial	2	2
(5) Electrical appliances owned		
iron	33	22
refrigerator	9 ^{a/}	9
radio	3	5
washing machine	7	4
television set	14	4
stove	12 ^{a/}	1
water heater	2 ^{a/}	1
hot plate	0	0
all other appliances ^{b/}	12	7
(6) Did ownership increase income?		
yes	5	7
no	35	18

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* Two percent of total members

^{a/} includes one disconnected^{b/} record players, blenders, jukeboxes, coffee-makers, freezers, electrical tools, sewing machines, and other

QUESTIONNAIRE RESULTS IN TWO COOPERATIVE ELECTRIC SYSTEMS

	<u>Los Santos Number</u>	<u>San Carlos Number</u>
(7) Satisfied with service?		
yes	35	23
no	3	2
(8) Satisfied with price of electricity?		
yes	25	17
no	19	11
(9) Additional desired electrical appliances		
iron	0	2
refrigerator	3	5
radio	3	3
washing machine	2	2
television set	1	2
stove	3	4
water heater	0	0
hot plate	0	0
all other appliances	2	1
none	25	16
(10) Would ownership increase income?		
yes	1	0
no	37	21
(11) Interest in acquisition from electric coops.		
yes	19	29
no	9	0
no opinion	14	0
(12) Occupation		
farm	20	15
commerce	7	10
factory	9	0
other	8	4

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APPENDIX B

QUESTIONNAIRE RESULTS IN TWO COOPERATIVE ELECTRIC SYSTEMS

	<u>Los Santos Number</u>	<u>San Carlos Number</u>
(13) Income of interviewee (\$/month)		
0 - 200	5	1
200 - 499	8	11
over 500	20	9
no answer	9	7

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INDUSTRIAL USERS OF ELECTRICAL ENERGY, BY TYPE AND AREA

MAY 1971

1. Los Santos

<u>Type</u>	<u>Number</u>	<u>Monthly Consumption (KWH)*</u>
coffee Processing	8	63,712
bags and twine	1	137,200
soluble coffee	2	
cement blocks	1	
milk processing	3	
bakery	2	
furniture	1	
auto repair	1	
rock crusher	1	
asphalt mixing	1	
pumtping station	1	
	<hr/>	
	22	192,357

2. San Carlos

sawmills	7	
sugar mills	4	
coffee processing	3	
rock crushers	2	
milk processing	54	
construction	1	
	<hr/>	
	71	141,050

3. Guanacaste

sugar mill	1	
ice plant	1	
cotton gin	1	
furniture	1	
water pumping	6	
grain drying	3	
mechanical auto repair	4	
	<hr/>	
	17	83,267

* Year ending May 1971

PROJECTED SOURCES & USES OF FINANCING
(000)

<u>Uses</u>	<u>Sources</u>			<u>A. I. D.</u>		<u>Total</u>	<u>Grand Total</u>
	<u>I. C. E.</u>	<u>Nat. Bank</u>	<u>Mem- bers</u>	<u>Local. Cost</u>	<u>Dollar</u>		
	2,215	3,325	--	6,437	15,215	21,652	27,192
Physical Plant		2,840	--	5,905	12,841		21,586
Personal Services		2,208	--	--	665		2,873
Other		392	--	532	1,709		2,633
Total		5,440	--	6,437	15,215		27,192

Actual sources and uses of financing

<u>Uses</u>	<u>Sources</u>						
	1,702	1,000	2,930	NA	NA	21,640	27,272
Physical Plant	NA	NA	NA	NA	NA	NA	NA
Personal Services	NA	NA	NA	NA	NA	NA	NA
Other	NA	NA	NA	NA	NA	NA	NA
Total	1,702	1,000	2,930	NA	NA	21,640	NA

Source: Projected: Capital Assistance Paper
Actual: Gilbert F. Moon "Final Report"
(data as of May 1969)

This is incomplete, but represents the best data from available records within the time available.

PART V - Observations and Recommendations Regarding
Post Evaluation of Completed Capital Projects

That portion of the evaluation of completed capital projects as applied to electric power was worthwhile. As discussed in Part IV, this project not only entailed the use of electric power facilities but also entailed the development of a unique institution, the rural electric cooperative.

The initial conclusion is that further evaluations with attention to the types of other electric power projects would be in order. Several thoughts however, need to be kept in mind, both in the selection of the projects to be evaluated, the length of time they have been in service and the nature and make up of the evaluation team.

The first conclusion one might reach concerned distribution systems, such as these were, in that two years after energization is too soon for evaluation.

From the standpoint of being a new institution, namely that of being a rural electric cooperative, the same period is too short. A period more like five years would be appropriate. This assumes that the projects have in their make-up all the necessary ingredients to carry them through a five year period. As it turned out for this particular rural electric program where these ingredients were not incorporated, it perhaps is fortunate that the evaluation was made at the two-year point. It means that now it is not too late for there to be a feed-back in terms of positive technical assistance to remedy some of the shortcomings.

These evaluations should not be done on short notice. They should be carefully planned, researched and staged. There should be a positive plan for feeding the results of the evaluation back into the development lending procedures of all geographic Regional Bureaus. The results would be applicable whether the lending is for a capital project or is a sector loan in the field of electric power.

The plan of evaluation and the specific data required should, before the evaluation is commenced, be made known to US A.I.D., the B/G's concerned, their participating institutions and the electric systems in writing in ample time for all concerned to gather the information required for the evaluation team. Especially in the case of social overhead projects, it may be necessary to develop one's own data (e.g. sample surveys).

Unless the evaluation team has developed a rapport on the basis of working together in several similar instances, it may prove more practical for members of the team to work independently by disciplines, rather than together as a unit, particularly during field work and research stage.

Some points can be made for keeping the group together as a team but the ability of the individuals to probe and seek in their own way those things which they are best able to determine and evaluate seem preferable to the monolithic team approach.

The evaluation team should be composed of all disciplines pertinent to the type of project under study, e.g., for rural electrification, - engineer, economist, rural development officer, financial analyst (can be controller or auditor), rural electric cooperative specialist (if a state-owned or private company, substitute utility management specialist).

All independent work already accomplished or under way, together with copies of related documents, should be made known to the evaluation team and these should be in AID/W some weeks before evaluation actually begins so that the U.S. evaluation team members can jointly discuss all aspects with representatives of the Bureau, the Desk, the Controller and the Auditor General.

Familiarity with the project and with the host country is obviously an asset. This could be made available to the team in a variety of ways. The US A.I.D. in the country of the project might provide one of the team members and the team leader should correspond with this individual on all of these matters before the team completes the initial AID/W phase of the evaluation. But this person does not necessarily have to be a member of the current Mission staff since as was true in the Costa Rican case, Karl Koone was presently associated with the Nicaraguan Mission. In still other cases, it may be feasible for the team to approach the B/G directly.

All independent evaluations of the project under consideration regardless of when made should be discussed and cleared by Bureau, Desk, and appropriate staff offices, so that all efforts can be complementary, coordinated and scope of independent studies so developed as to enhance and expedite A.I.D.'s capital project development and evaluations.

Interpreters should be provided for team members who are not proficient in the language of the B/G and where the B/G personnel do not normally use English. In some circumstances team members may serve as interpreters, but this is usually undesirable because of the difficulty of simultaneously participating in, and translating for, a meeting..

US A.I.D. should plan beforehand and provide all required in-country transportation. At least three months should be programmed once the project to be evaluated and the team are selected before field work begins on an evaluation.

Field work is indispensable to evaluation of completed projects. One week may, in certain circumstances, be adequate for some team members but in other cases, for the more complicated projects, two or more weeks might be required for the different disciplines of the team. Not all team members need to spend the same length of time in the field.

Capital projects involving institution building or development of personnel should have a built in, after completion, technical assistance in-country program. This should probably be covered by a grant. The post completion evaluation should also evaluate the effectiveness of the technical assistance..

In AID/W there should be one central controlling and coordinating decision-making point in the selection of the project to be evaluated and the team.

This point, i.e., person or office, normally should be directly on a continuing basis involved in at least a monitoring aspect of capital project development as well as direct responsibility for capital project evaluation.

Loan agreements and letters of implementation should include provision for one or more "after completion" evaluations and include specific targets for this purpose. That is to say, the loan paper must establish clearly the purpose and objectives against which the after completion evaluation can be made.

One team member or special consultant to the evaluation team should have known the project area and the project development from first-hand experience before the project was implemented.

Post evaluation of completed capital projects should not be attempted on short notice, regardless of A.I.D. administrative requirements. If there is an urgency or an emergency associated with the project the necessary attention should be given by the Bureau and the USAID concerned as a separate and monitoring responsibility.

USAID should have responsibility for in-country monitoring on a continuing basis of capital projects with annual, bi-annual, or tri-annual reports to AID/W or, if US A.I.D. is not adequately staffed, AID/W personnel should do this. This is monitoring of operations, and not a substitute for less frequent Agency post-evaluation of completed capital projects.