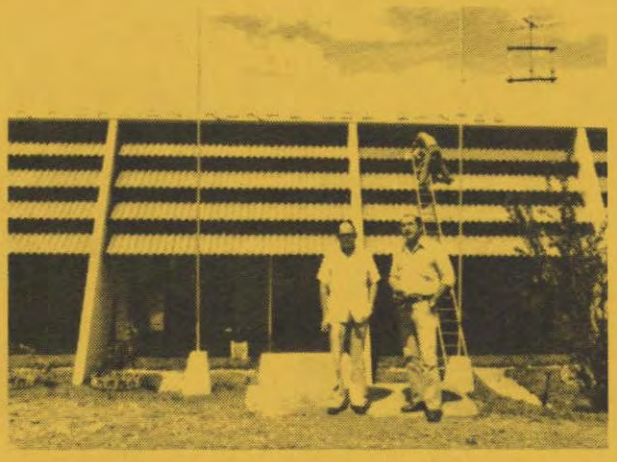
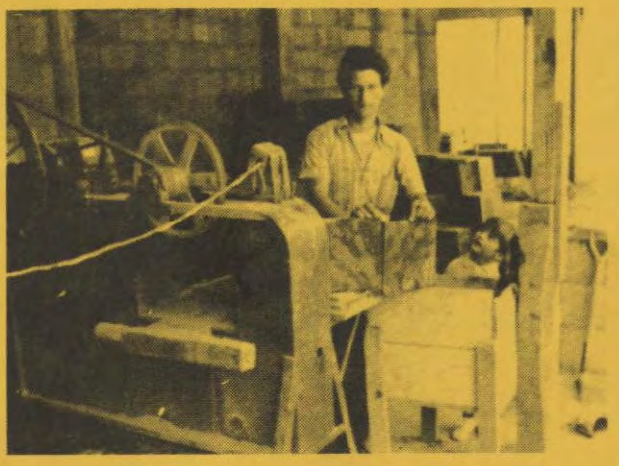
NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION
1800 MASSACHUSETTES AVENUE, N.W.
WASHINGTON, D.C. 20036

EVALUATION REPORT





RURAL ELECTRIC COOPERATIVE OF LOS SANTOS, R.L.

San Marcos de Tarrazu, Costa Rica, Central America

By

JAMES D. LAY
Management and Operations Advisor
International Programs Division

Report Prepared November, 1978

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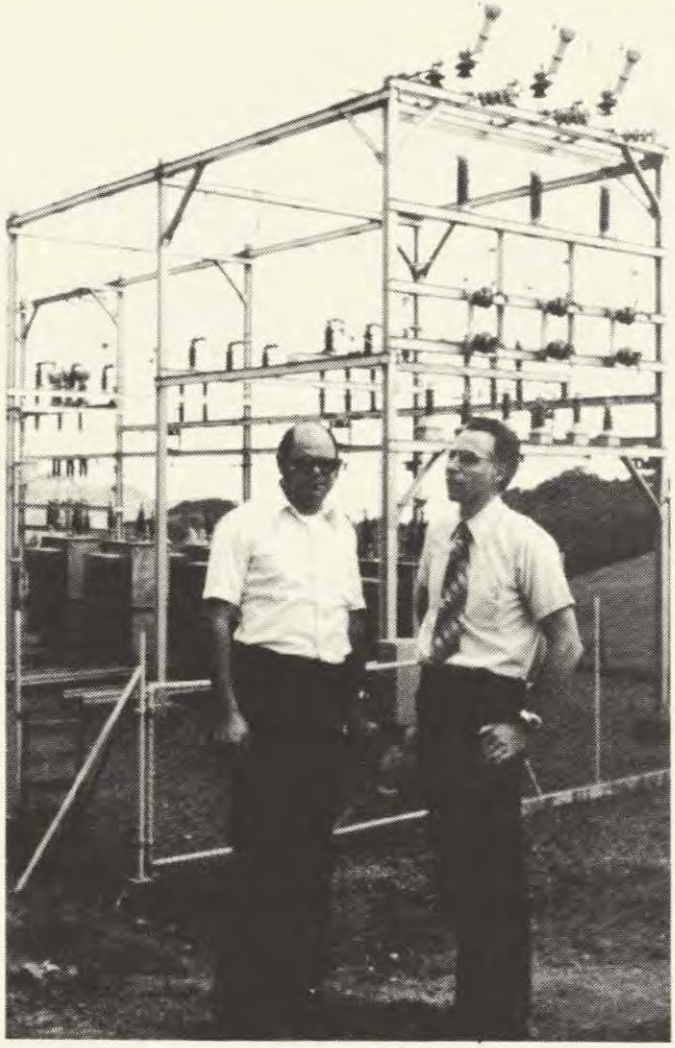


Glenn R. Benjamin, Director of Engineering Services, Public Utility District of Klickitat County, Washington with Misael Monge. Glenn did the Economic and Engineering Feasibility studies which led to the financing and construction of this system.

Misael **Monge** Alvarado, **Coopesantos** has served as Manager of this rural electric system for over 11 years and was Chairman of the organizing committee.

Harold Datta, Operations Officer, AID/PDC/PVC on field visit to Rural Electric Systems in Costa Rica.

Work session at first NRECA Management Seminar held in Costa Rica. Clyde Aultz, NRECA Management and Training Consultant and principle instructor is seated at far right.

Irrigation system for non-traditional agro-industry in the Santa Maria de Dota area of Costa Rica. This is a commercial flower-growing activity for the export of same.

I. INTRODUCTION

Between March of 1976 and October, 1978, a series of visits were made to the area served by the Rural Electric Cooperative of Los Santos, (hereinafter called COOPESANTOS), by James D. Lay, Management and Operations Advisor, NRECA, for the purposes of rendering managerial and operational assistance to said cooperative. In October and early November 1978, Mr. Lay undertook a socio-economic impact survey. The purpose of said survey was to "field test" a new Household Survey Instrument that was prepared by members of the NRECA International Programs Staff. (This instrument is part of an impact assessment methodology being developed by NRECA.) Other than an End of Contract Evaluation by the Agency for International Development (AID), no other evaluation of this project has taken place (to the knowledge of this writer).

In this evaluation, the NRECA staff member did not attempt to survey the total impact of the rural electric distribution system on the community, nor did he do an in-depth survey of agricultural, commercial, public, governmental or other uses of electricity. Materials, graphs and other statistics will be given which will give the reader some idea of both the impact and the growth which has taken place in the area served by the cooperative. By reference, the reader will be able to see that this is a well-managed, financially sound and economically viable electric utility concern. It is, and will continue to be, a potent force in the nine rural counties it serves.

II. SUMMARY

In the view of this evaluator, there can be no doubt that this co-operative has been a potent force in the development of this area served and has been an almost indispensible factor in the improvement in the level of living of the member/owners served. Though the Household Survey treats only 60 households and represents approximately one percent (1%) of the total number of consumers served, it does give us some insight into the impact being made. This summary will briefly discuss the service area and uses of electricity, the availability to and the impact of electricity on the poor and the impact on women.

A. Population Served and Uses of Electricity

By the end of September, 1978, this project was serving approximately six thousand (6,000) households, had some 6,551 consumers over more than 500 kilometers of line in an area estimated to be $1{,}000^2$ kilometers, (600 square miles), and was reaching a population of over 36,000 in parts of or all of eight counties in the Province of San Jose and one county in the Province of Cartago, and is located to the east and south of the Costa Rican capital of San Jose. At the time of the evaluation, the cooperative was serving towns and byways of some 28 districts. In the fiscal year 1977-1978, (October through September), the cooperative sold some 9,972,000 kilowatts of power valued at ₡3,528,000, (US$410,232.55). As of the end of the fiscal year, there were 5,603 residential accounts, 788 commercial accounts, 12 heavy industrial accounts, 16 light industrial accounts and 131 public lighting accounts.

For the year the cooperative purchased 10,762,000 kilowatts of power at a cost of £1,883.35, (US$218,994.18).

B. Service to Low Income Rural Residents

This cooperative is serving low income rural residents. While there are no hard data to support this thesis, one can see through visual inspection that many of the people (and the homes) of the consumers can definitely be classified as poor. If one examines the results of the household surveys made for this evaluation, one can see that the poor are being served. For all except the poorest of the poor, electricity is more affordable than either candles or kerosene for basic lighting. It is interesting to note, (see survey results), that of the ten homes surveyed that had no electricity, the occupants were spending the following on fuel per month, (word of mouth estimate):

Five were spending less than $2.00 (2 were inaccessible)

Three were spending between $2.00 and $4.00

Two were spending between $4.00 and $7.00 (1 inaccessible)

One was spending between $7.00 and $9.99

Considering that 78% of the 60 households surveyed estimated that they spent less than $10.00 on monthly fuel needs and 41% said that they spent less than $7.00, the non-adopters and inaccessibles were spending what this evaluator considers a high percentage on fuel without having the continuous benefits of electricity.

Fifty percent of the residential users of COOPESANTOS use the minimum amount of electricity per month -- 30 kilowatts per house at a cost of $1.47. (These minimum consumers usually cook by woodstove.) Since it was estimated that those who light their homes by either candles or kerosene spend between ₡8.00 and ₡30.00, ($.93 and $3.48), it would certainly appear less expensive for the average consumer to use electricity for basic lighting.

For the reader it may be interesting to note that it is estimated that the minimum consumer will generally have three to four lightbulbs, two or three electric outlets and either an iron or at least one small appliance, such as a radio, a blender or a black and white television.

This cooperative does have a social tariff which is based on the ability of the consumer to pay. As stated above, the minimum bill for 30 Kwh's per month is $1.47. The next 20 Kwh's cost .0475¢, the following 50 Kwh's @ 0.0457¢, the next 150 @ 0.0296¢, the next 250 for 0.0386¢, the next 500 for 0.0412¢, and all over 1,000 Kwh's for 0.0463¢. This means that if a consumer used 110 Kwh's, his bill would be computed as follows:

First 30 Kwh's	$1.47
Next 20 Kwh's @0.0475	.95
Next 50 Kwh's @0.0457	2.29
10 Kwh's @0.296	.30
Total Cost	$5.01

Certainly, all but the poorest of the poor can afford $5.00 a month to have the benefits of electricity. It can be seen that

this rate is lower than many U.S. rates.

C. Women in Development and Impact of Electricity on Women

The education of and opportunities for women are greater in Costa Rica than in most of Latin America and other lesser developed areas of the world. Almost all women have at least a primary (6 years) education. Many go on to complete high school and a goodly number go on to become professionals -- doctors, lawyers, accountants, businesswomen, etc. All women of majority age, (18 years), can vote, whether they are literate or not.

In the area served by COOPESANTOS, a rural area, not too many of the women are professionals. In the survey of 60 households made for this evaluation, it shows that there were three professional women, 54 of the women voted, one woman was involved in community service and two women could shop independently. (It is the feeling of this writer that this section of the Household Survey Form needs to be re-worked. The data given above is based on a descending order of value, i.e., being able to work as a professional being the highest level of achievement. and having to stay at home, (not shown), being the lowest level of achievement. Many of the women interviewed were involved in community service, but the survey form has no way of showing that unless it is the highest level of achievement.)

This interviewer was surprised that a substantial number of these

rural housewives were not able to shop independently. They either went with their husbands to shop -- buying food, clothes, etc. -- or the husband did all of the shopping. No hard data was secured because it was not realized to be of significance until well over 1/3 of the interviews had been completed.

In spite of the gains that have been made by women in Costa Rica, it can be concluded that the rural Costa Rican female has a good ways to go before being "emancipated".

III. RECOMMENDATIONS

This section on recommendations will be divided into two parts. The first section will be concerned with recommendations concerning the evaluation. The second section will treat recommendations concerning the Cooperative and NRECA's continuing relationships with the Cooperative.

A. The Evaluation

As stated in other parts of this report, this was not to be a full evaluation of the social/economic impact of COOPESANTOS on the area it serves but solely a "Field Test" of the Household Survey Instrument. The instrument itself needs additional work and then further field testing, but basically it is a good instrument and a better and less complicated one than the evaluator has used in previous evaluations. It is the recommendation of this evaluator that we do indeed try to improve this instrument and work with all necessary groups to refine it, and then adopt it as NRECA's Instrument to Undertake Household Surveys. It would be desirable and useful to have some of AID's experts comment on the form and the results obtained. It is further recommended that we attempt to complete the whole methodology of which this is only a part so that we can field test the complete instrument and prove its validity.

B. The Cooperative and Future Cooperative/NRECA Relationships

It is recommended that we continue to assist this cooperative. This evaluator believes it to be a strong one, and it does have strong, trained management. The management is receptive to the training of its board and entire staff. This evaluator firmly believes that the Manager of this Cooperative is vital to the rural electric cooperative movement in Costa Rica and is, and will continue to be, vital to the future of all of the rural electrics in Costa Rica. It is my belief also that he is important to the survival of the rural electric cooperatives in Latin America. My final recommendation is that we continue to program Management Evaluations and Impact Evaluations of this cooperative so that we can assist the cooperative to have the most efficient management possible, and, at the same time, deliver reliable central station electric service to its consumer/owners at a price they can afford to pay, with particular attention to the rural poor.

Glenn R. Benjamin, NRECA Consultant, visiting the Rope Making Factory of **Textiles y Cordeles**, a large agro-industrial operation served by **Coopesantos**. In addition to manufacturing rope and other sisel hemp products, the complex also produces pre-fab houses, furniture, fiberglass products and nylon fibers for rope and sacks.

Conversation with the President concerning rural electric cooperatives in Costa Rica. (l. to r.) Rodrigo Carazo, President of Costa Rica; Misael Monge, and James D. Lay, Regional Administrator for Latin America and the Carribean, NRECA/IPD.

Farm irrigated by pump from electricity supplied by **Coopesantos** land now used to support dairy herd. Fourteen parcels are irrigated on a rotating basis.

Misael Monge, Manager, **Coopesantos** (standing) and Geoff Smith, NRECA Management and Training Consultant (seated in rear) at second NRECA Management Seminar.

Claudio Urena, Board Member, **Coopesantos**, participating in First NRECA Management Seminar Workshop Session. (In center of Photograph.

IV. EVALUATION

A. Background on Rural Electrification in Costa Rica

Glenn R. Benjamin, NRECA Engineering Specialist, undertook engineering and feasibility studies in 1963 and 1964, submitting his study and recommendations to the USAID Mission in San Jose in November, 1964.

On October 27, 1965, AID Loan No. 515-015 was signed for $3,300,000.00, matched by local funding of $818,000.00, with the purpose of organizing and constructing three rural electric cooperative distribution systems to serve some 14,000 members/consumers within the first ten years. The following cooperatives were organized:

1) Cooperativa de Electrificacion Rural de Guanacaste, R. L. (COOPEGUANACASTE), Santa Cruz, Costa Rica

2) Cooperativa de Electrificacion Rural de San Carlos, R. L. (COOPELESCA) (Originally called Tres Amigos), Ciudad Quesada

3) Cooperativa de Electrificacion Rural de Los Santos, R. L. (COOPESANTOS), San Marcos de Tarrazu

The program was implemented through the National Bank of Costa Rica, (Banco Nacional de Costa Rica - BNCR), as the borrower, with the Costa Rica Institute of Electricity (Instituto Costarricense de Electricidad - ICE), and NRECA as consultants to the rural electric cooperatives. Construction work was started on October 17, 1967. The first segment of COOPEGUANACASTE was energized in June of 1968. COOPESANTOS was energized in April of 1969, and

COOPELESCA was energized in May of 1969. As of June, 1969, the three cooperatives were giving service to approximately 7,500 consumers.

NRECA, under contract to BNCR, provided the services of an engineering-management specialist, with responsibility for coordinating materials procurement, construction and energization and initial management development during construction. NRECA's termination of assistance under this contract was July, 1969.

B. Evaluation of COOPESANTOS

1. Background Information on the Cooperative

a. Date of Incorporation: May 10, 1965

b. Date of Initial Energization: April 25, 1969

c. Number of Consumers: September 30, 1978 - 6,551

d. Megawatt Hours (MWH) Sold Fiscal 1977-78: 9,972

e. Population Served (Estimated): September 30, 1978: 36,000

This cooperative is located in the central highlands of Costa Rica, approximately 75 kilometers southeast of the capital city of San Jose in the Province of San Jose. It presently has distribution lines and services in the counties of Tarrazu, Dota, Leon Cortes, Acosta, Asseri and Desamparados in the Province of San Jose, and in the county of Cartago in the Province of Cartago. The cooperative has been in operation for about 9 1/2 years.

No data are available on the extent of electric service prior to the cooperative, but the leaders of the cooperative state that central station electricity was non-existant and only a few of the

towns presently served had "municipal" systems. Cooperative leaders estimate conservatively that 45% of the geographic area served is electrified. They estimate that 90% to 95% of those along the distribution lines are served.

Attached as Appendices A.1. through A.6. are graphs which will give the reader information concerning projections and growth of the cooperative.

2. Evaluation Methodology

NRECA, through the work of Phil Costas and James D. Lay, is in the process of developing a socio/economic impact instrument. The draft instrument which was used in this evaluation is a result of experiences gained in Bangladesh, Chile, Costa Rica, Indonesia and the Philippines.

This evaluation of COOPESANTOS was undertaken to "field test" the household survey part of the instrument. An attempt is being made to select the critical key performance areas in energy consumption level and the level of living. This is part of a methodology that will also measure the impact of rural electrification at the village level and the district, (or other political sub-division), level. A sample questionnaire of the survey is attached as Appendix B.

To "field test" the instrument, James D. Lay went to Costa Rica to survey a number of households served by COOPESANTOS. The original plan was to survey ninety (90) households in the

geographic area served by COOPESANTOS and adjacent non-electrified areas as follows:

Three distinct geographic areas - thirty households in each:

20 Adopters (users of electricity from cooperative)

5 Non-Adopters (households in electrified area without service)

5 Inaccessibles (out of reach of distribution lines)

Because of time, manpower and weather restraints, only sixty (60) households were surveyed, as follows:

49 Adopters

7 Non-Adopters

4 Inaccessibles

The evaluator realizes that 1% of served consumers is not a statistically significant number to constitute a valid evaluation, but the instrument was "field tested" and a presentation of the results can serve as a guide to the validity or the non-validity of the instrument and in the process give us some idea of the impact of rural electrification. In preface to an examination of the results of the survey, let me state that it was very difficult to come up with Non-Adopters. I do not exaggerate when I say that the seven Non-Adopters represent 100% of the houses without electricity that I saw in the areas in which the surveys were conducted. (This is emphasized because of allegations in another

report to AID, which stated that no more than half of the rural poor were being served by rural cooperatives.)

Interviews took place in five areas -- namely, San Marcos de Tarrazu, San Pablo de Leon Cortes, Failes de Desamparados, Santa Maria de Dota and Napolis de Tarrazu. The last area is located some 18 kilometers (12 miles) from the nearest installed electric distribution line and is where the four Inaccessibles were surveyed.

The survey instrument is designed to measure energy consumption level and the level of living at the household level. Theoretically, each of these two categories would yield 100 points for a total of 200 points for a total score. But, if one was to examine the form, it is impossible to obtain 100 points in the energy consumption level. In item B., the maximum points a household could score is eight (8). Also, in the service area there is not now, nor will there likely be in the foreseeable future, any extensive use of heating or air-conditioning appliances, (see item J.). Because of the above, the evaluator has discounted six (6) points from this category and all the analysis is based on the maximum possible ninety-four (94) points in the energy consumption level. There is no reason why a household could not attain the 100 point level in the Level of Living Category.

3. Survey Results

Attached as Appendix C, Charts #1 and #2, are the actual scores of all households surveyed, listing by categories the three types of households -- the Non-Adopters, the Inaccessibles and the Adopters. All scores are listed in descending order. Below the reader can see a summary of the raw results of the survey.

a. Composite Level - Energy Use Level and Level of Living

The Average Composite Level of Non-Adopters is	52.4
The Average Level of Inaccessibles is	76.8*
The Average Level of Adopters is	116.7

b.3.a.

The Range of Non-Adopters is	39 to 59
The Range of Inaccessibles is	61 to 112
The Range of Adopters is	56 to 168

b.3.b. Energy Consumption Level

The Average Level for Non-Adopters is	21.7
The Average for Inaccessibles is	24.3*
The Average for Adopters is	55.5
The Range for Non-Adopters is from	19 to 40
The Range for Inaccessibles is from	17 to 70*
The Range for Adopters is from	28 to 74

b.3.c. Level of Living

The Average Level for Non-Adopters is	27.6
The Average for Inaccessibles is	52.5*
The Average for Adopters is	64.0
The Range for Non-Adopters is from	19 to 40
The Range for Inaccessibles is from	42 to 70*
The Range for Adopters is from	28 to 94

* The composite levels for the Inaccessibles are somewhat distorted because one of the households has a five horsepower gasoline generator.

4. Analysis of Results

In analyzing the results of the surveys by quartile level, we can note some interesting aspects of this study. In the composite level, we can see that 14% of the Adopters fall into the upper or fourth quartile, (upper 25%), while none of the Non-Adopters nor the Inaccessibles do. The largest percent of Adopters fall into the third quartile, (65%), while only 25% of the Inaccessibles and none of the Non-Adopters fall in this quartile. Twenty-one percent of the Adopters fall into the second quartile, 75% of the Inaccessibles and a large 86% of the Non-Adopters. Only Non-Adopters, (14%) fall in the lowest or first quartile. The above results appear to indicate that the Adopters have a far superior composite level when compared to the Non-Adopters and, except in cases where a person can afford his or her own private generation plant, the Adopters have a far superior composite level than the Inaccessibles.

In the energy consumption level, we see somewhat a different picture. Only 2% of the Adopters fall in the fourth quartile, while a large 78% fall in the third quartile and none fell in the first quartile. Only one of four of the Inaccessibles fell in the second quartile while the other three fell in the first quartile. None fell in the third or fourth quartiles. All of the Non-Adopters fell in the lower 50% with a full 75% falling in the lowest or the first quartile.

In the Level of Living Category, we note a similar picture, but there are a few surprises. We see that 71% of the Non-Adopters fall in the second quartile, (as compared to 29% in the Energy Consumption Level), and 50% of the Inaccessibles fall in the same quartile, (as compared to 25% in the Energy Consumption Level). This would appear to indicate that a lack of energy consumption does not necessarily equate with a poor standard of living, though it does indicate that those with access to energy could have a better standard of living, since we can see by examining the details that a full 69% of the Adopters fall in the upper 50% in this category and none fall in the lower 25%

Details of quartile ratings can be seen in Appendix D.

Also see Appendix E. for an Analysis of Score by Line Item.

V. COMMENTS ON SURVEY

Many more hours of analysis could be spent on the information gathered in this survey, but the evaluator feels that now is not the time to do such analysis. The primary reason for this is because the sample is too small and the results might be a distortion of reality. However, the evaluator does feel that this has been a good field test of the survey instrument and with improvement, the instrument can really be an excellent tool for measuring the impact of electricity in areas receiving service. It can also be used as an instrument in gathering base-line data for non-electrified areas. It is essentially an easy-to-use document that does give us information concerning the household consumption of energy and the level of living in those households. If this can be coupled with similar instruments for gathering data on the village and district levels, it should be a superb evaluation impact process, which can be conducted by almost anyone with minimum training in data gathering and compilation techniques. Analysis of such data is another matter. This must be discussed in greater detail by NRECA staff personnel, AID personnel and by host country and distribution systems' personnel.

VI. GENERAL COMMENTS

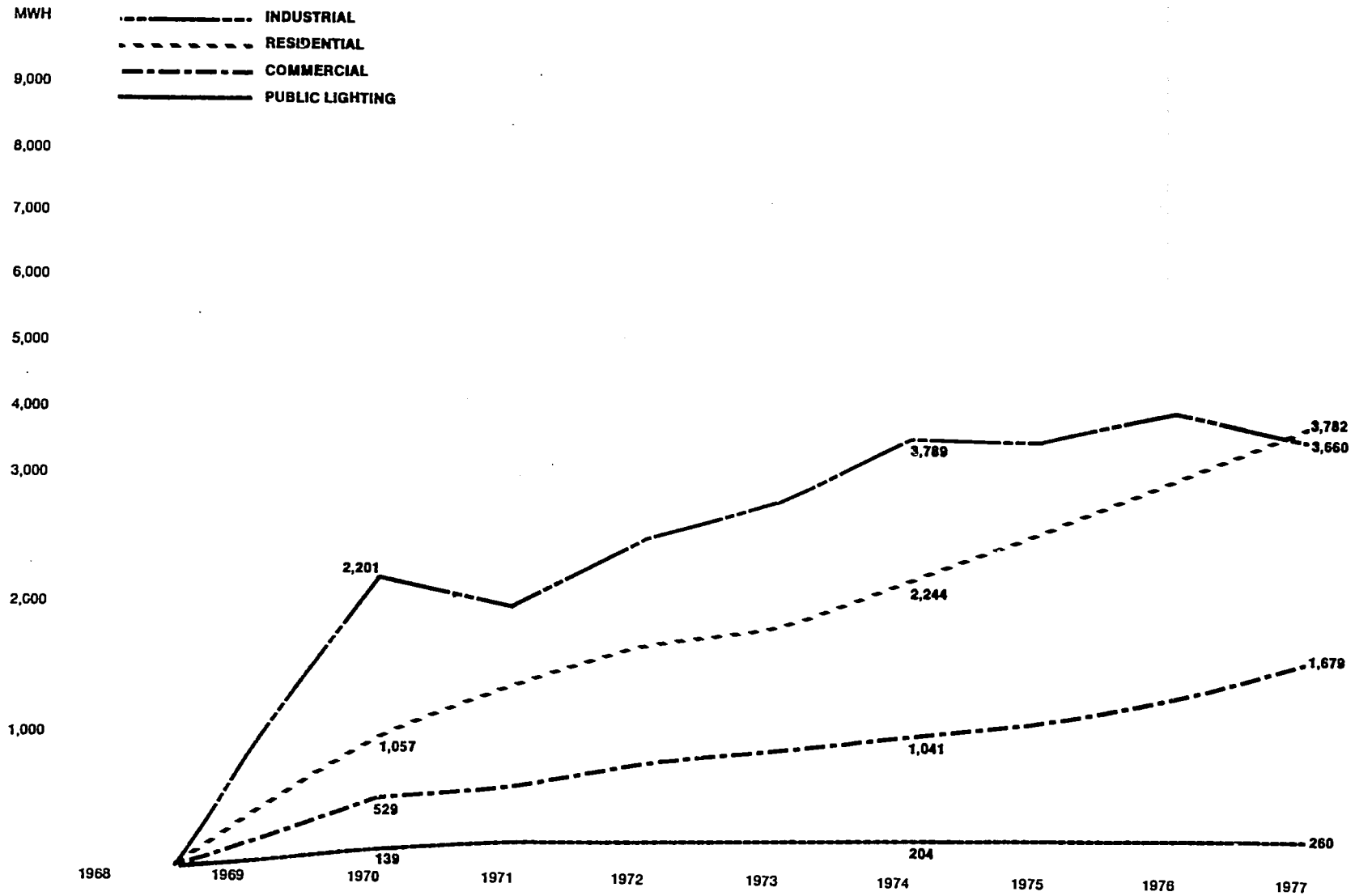
It is the opinion of this writer that this cooperative is doing well, financially, operationally and from a social/economic point of view. It is economically and financially sound (see financial records in NRECA files). It is operationally efficient. In recent years this cooperative has followed a rather conservative pattern of expansion while assuring that low income persons receive electric service once it becomes available in any given area. This is a coffee producing area, and many of the residents have profited handsomely because of the rise in the price of coffee. Under these moderately affluent conditions, the board of directors and the management of the cooperative have followed a policy of "pay-as-you-go" and have participated in funding programs from outside to allow them to serve the low income residents without penalizing the "average" consumer/owner. Growth records are shown on the accompanying graphs, (Appendix A). These graphs show a steady growth, albeit below expectation as projected in the feasibility study done by Glenn R. Benjamin. See Appendix F.1 for comparisons between projections and actual sales. In spite of the fact that this cooperative has not lived up to projections, this evaluator sees no cause for concern.

However, this cooperative should expand on the excellent beginnings of a power use program, especially in promoting agricultural uses of electricity on the farm. Other than about 15 irrigation systems, (mostly from rivers), this writer saw almost no agricultural use of

electricity on the small and medium farms. The cooperative might also promote a program of diversity in small and medium industrial activities. Most of the industrial accounts are coffee processing plants. If there is a bad harvest of coffee, there is a significant drop in the use of electricity. (Note Chart, Appendix F.2. Ten of the fifteen demand accounts are coffee processing plants.)

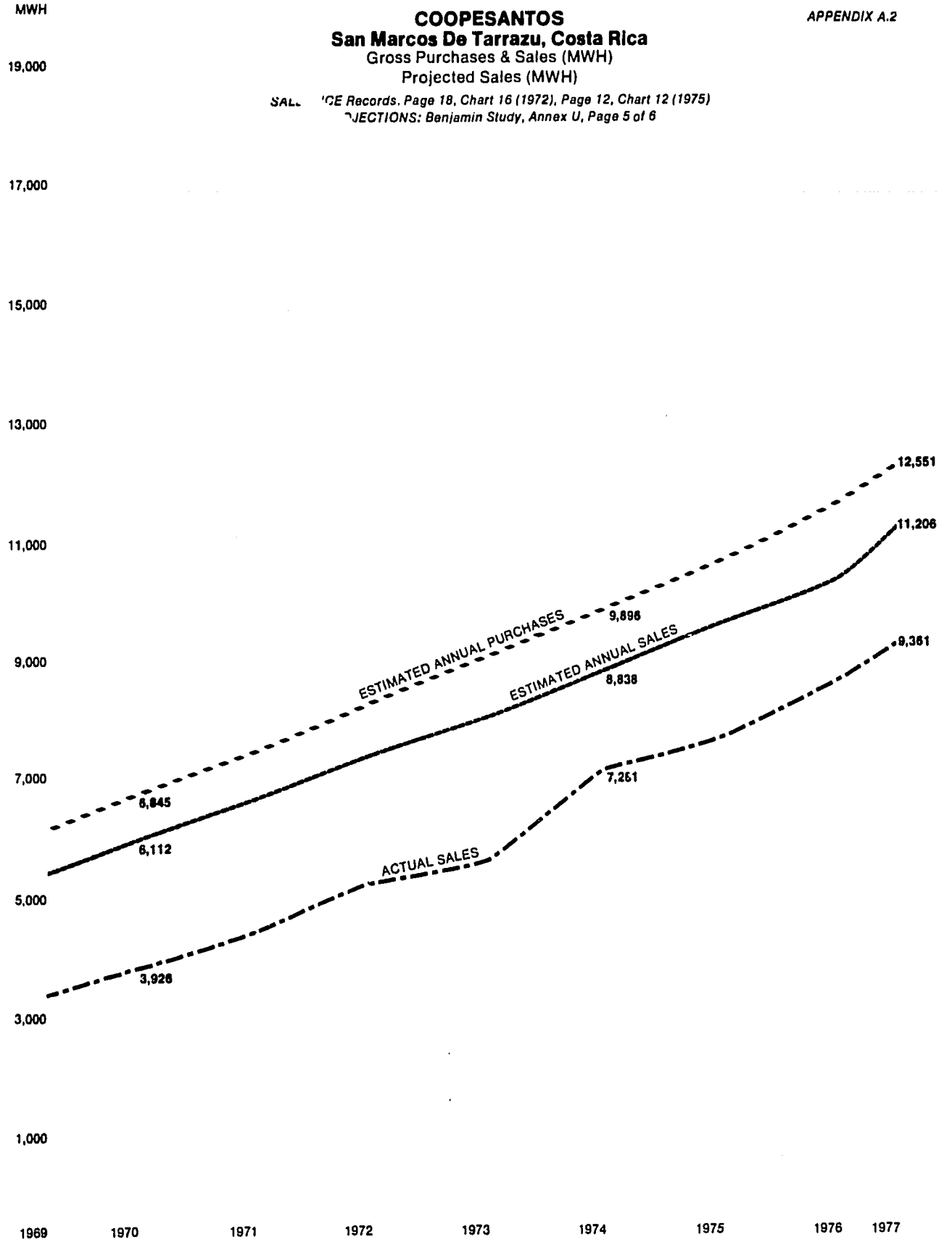
This cooperative is a strong believer in the education and training of its board members and its personnel. Almost all of its board members have participated in the NRECA Management Institute, "Principles of Modern Management for Rural Electric Cooperatives". All of the key staff members, including the manager, have also participated. One staff member participated in training in the United States for four months, concentrating on membership education and power use. The manager is planning to come to the United States to spend up to six months with various rural electric cooperatives -- studying the management systems, accounting systems, operations systems, and more to add to his already significant knowledge of modern management.

COOPESANTOS
San Marcos De Tarrazu, Costa Rica
Sales (MWH) By Category
SOURCE: ICE & COOP RECORDS

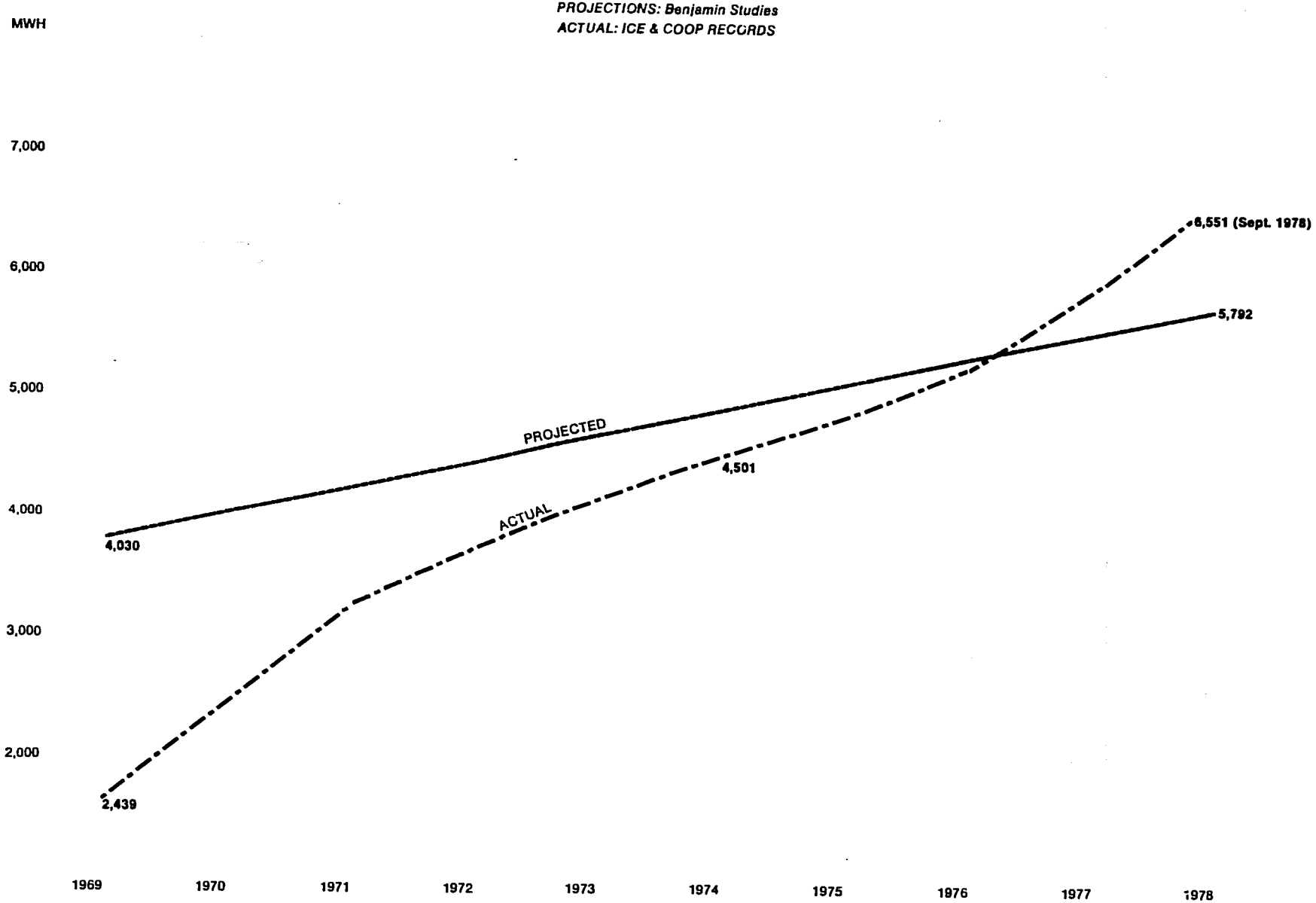


COOPESANTOS
San Marcos De Tarrazu, Costa Rica
Gross Purchases & Sales (MWH)
Projected Sales (MWH)

SALES: ICE Records, Page 18, Chart 16 (1972), Page 12, Chart 12 (1975)
PROJECTIONS: Benjamin Study, Annex U, Page 5 of 6

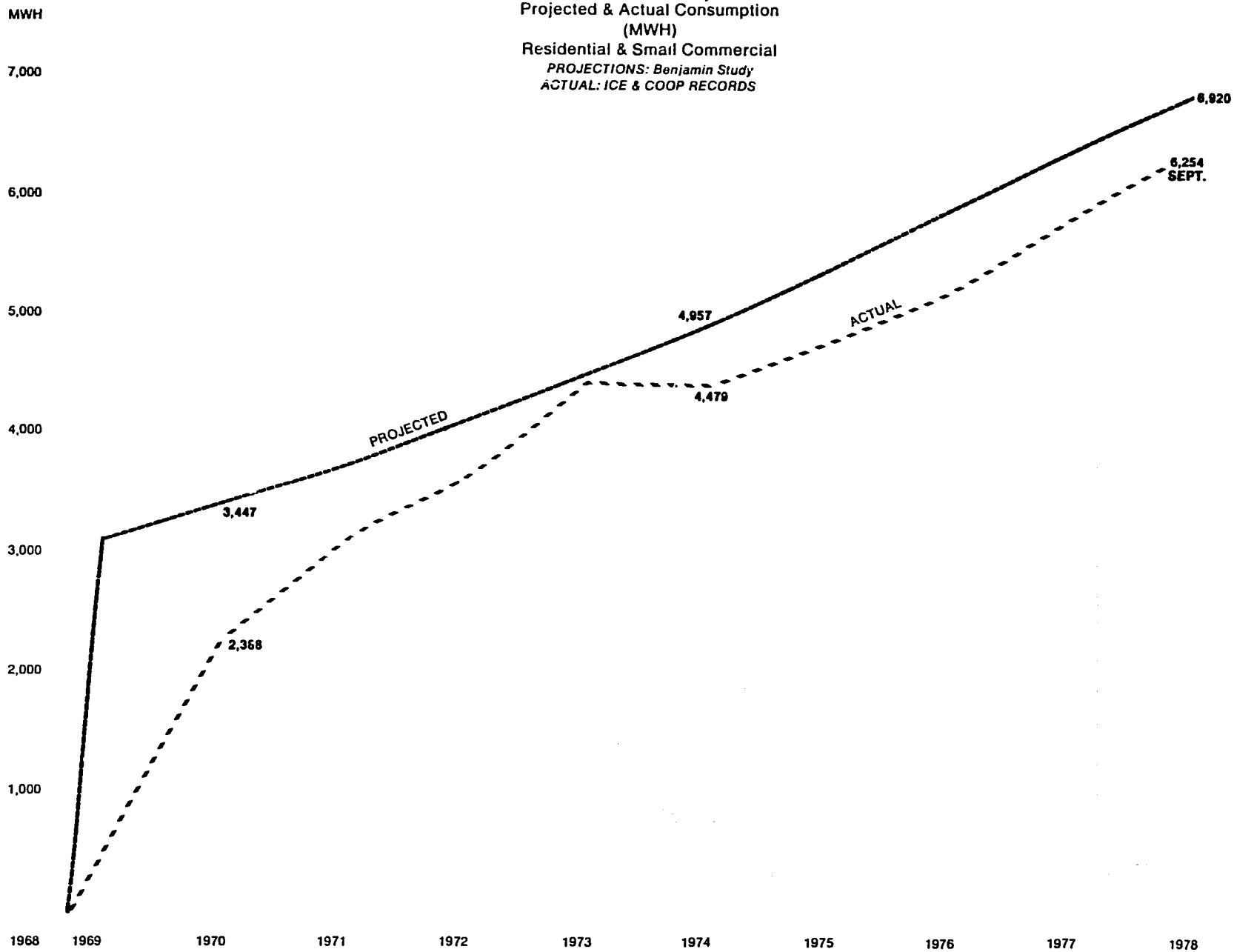


COOPESANTOS
San Marcos De Tarrazu, Costa Rica
Meter Connections
Projected & Actual
PROJECTIONS: Benjamin Studies
ACTUAL: ICE & COOP RECORDS



COOPESANTOS
San Marcos De Tarrazu, Costa Rica
Projected & Actual Consumption
(MWH)
Residential & Small Commercial
PROJECTIONS: Benjamin Study
ACTUAL: ICE & COOP RECORDS

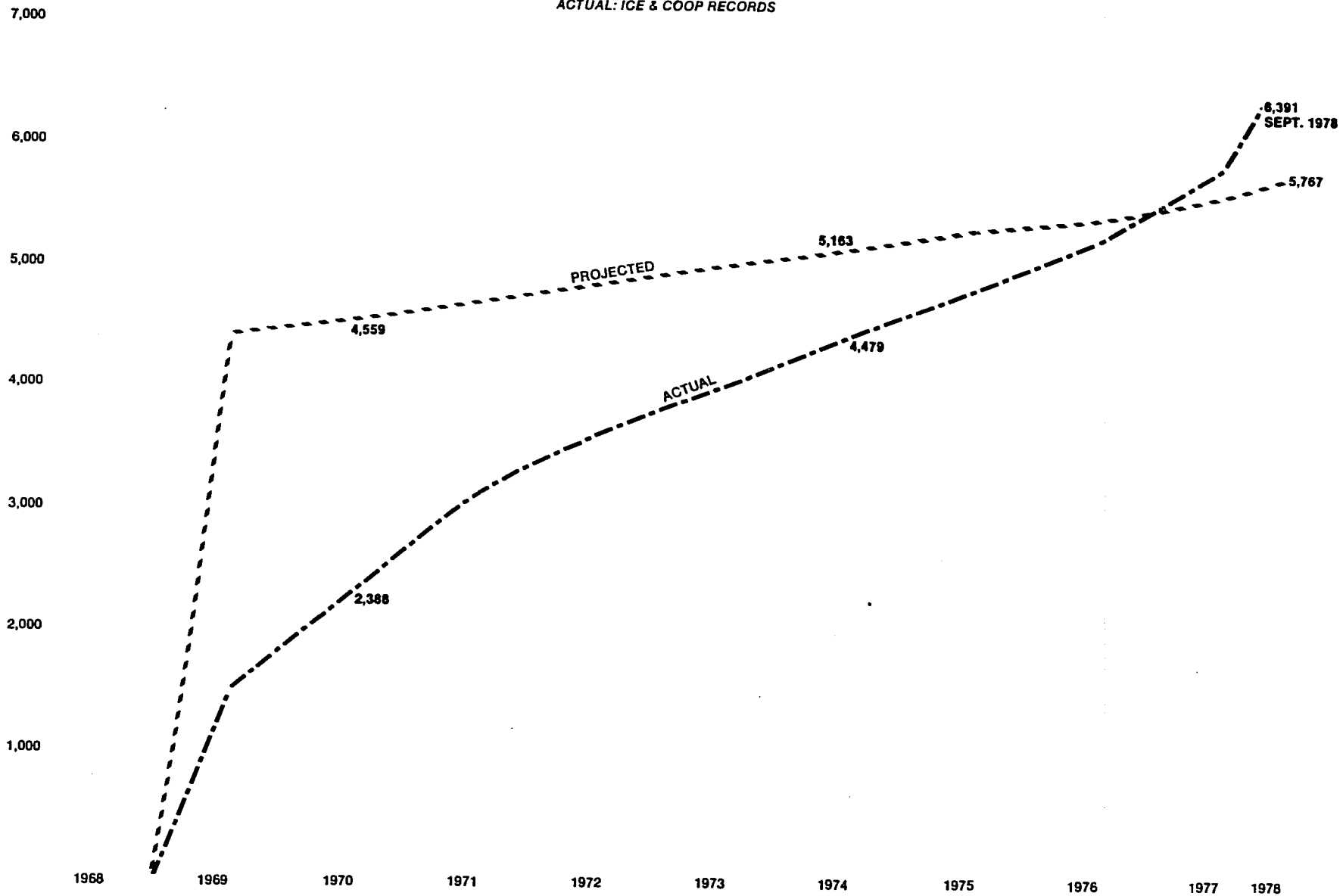
APPENDIX A.4



COOPESANTOS
San Marcos De Tarrazu, Costa Rica
Projected and Actual
KWH Consumption/Month/Consumer
Residential & Small Commercial
PROJECTIONS: Benjamin Study
ACTUAL: ICE & COOP RECORDS

COOPESANTOS
San Marcos De Tarrazu, Costa Rica
Projected & Actual Consumers
Residential & Small Commercial
PROJECTIONS: Benjamin Study, Annex U, Page 5
ACTUAL: ICE & COOP RECORDS

APPENDIX A.6



VI. HOUSEHOLD ENERGY USE INPUT EVALUATION FORM

BACKGROUND INFORMATION

_____Cost of local unit of wood (Unit_____)	_____Quantity Used Per Month
_____Cost of Gallon (Liter) Kerosene	_____Quantity Used Per Month
_____Cost of Pound/Kilo/Local Unit____of Candles	_____Quantity Used Per Month
_____Cost of Local Unit _____of Propane Gas	_____Quantity Used Per Month
_____Cost of Local Unit _____of Charcoal	_____Quantity Used Per Month
_____Cost of Fuel for Auto-Generated Electricity Per Gallon/Liter or Local Unit	_____Quantity Used Per Month
_____Cost of Batteries Per Local Size_____	_____Quantity Used Per Month
_____Cost of Other Fuel Per Local Unit____ (Coal, Dung, Other_____)	_____Quantity Used Per Month
_____Cost of Central Station Electricity Per KWH	_____KWH Used Per Month

HOUSEHOLD ENERGY USE (Check Highest Level Applicable Unless Otherwise Indicated)

A. Energy Expenditures Per Month		Value
1. Less than $1.00	_____(0)	
2. $1.00 - $2.00	_____(2)	
3. $2.00 - $3.99	_____(4)	
4. $4.00 - $6.99	_____(6)	
5. $7.00 - $9.99	__X__(8)	
6. $10.00 or more	_____(10)	__8__

B. Electric Service Availability and Reliability	
1. No Electric Service	_____(0)
2. Limited Service/Private Plant/ Single Household Gas/Diesel/Hydro/Other _____ (Circle One)	_____(2)
3. Limited Service/Shared Plant/Gas/Diesel Hydro/Other_____(Circle One)	_____(4)
4. Limited Service/Community Plant - Private Municipal Gas/Diesel/Hydro/Other _____ (Circle One)	__X__(6)

(SAMPLE FORM - Household Survey Questionnaire)

5.	24 Hour Central Station Service - Unreliable (Outages Frequent - more than 24 hrs. in one month)	_____(8)	
6.	24 Hour Central Station Service - Reliable (Very Few if Any Outages in a Month)	_____(10)	6

C. Lighting Level?

1.	Candles Only	_____(0)	
2.	Kerosene Lamp - Limited	_____(2)	
3.	Kerosene Lamp - Unpressured	_____(4)	
4.	Kerosene Lamp - Pressured	_____(6)	
5.	Electric Lighting - Basic	_____(8)	
6.	Electric Service - Outside of House	X (10)	10
7.	Other _____		

D. Cooking Facilities?

1.	Outdoor	_____(0)	
2.	Fireplace	_____(2)	
3.	Wood Stove	X (4)	
4.	Kerosene or Oil Stove	_____(6)	
5.	Gas Portable Burner or Electric Hotplate	_____(8)	
6.	Gas or Electric Stove	_____(10)	
7.	Other _____		4

E. Housekeeping Appliances and Home Repair Equipment?

1.	All Manual	_____(0)	
2.	Charcoal Iron/Flat Iron	_____(2)	
3.	Electric Iron	X (4)	
4.	Electric Kitchen Appliances or Hand Tools	_____(6)	
5.	Electric Vacuum Cleaner or Sewing Machine	_____(8)	
6.	Automatic Clothes Washer/Dryer or Shop Equipment	_____(10)	4
7.	Other_____		

F. Food Preservation Appliances?		Value
1. None	X (0)	
2. Icebox, Occasionally	_____(2)	
3. Icebox, Regularly	_____(4)	
4. Mini Refrigerator	_____(6)	
5. Refrigerator	_____(8)	
6. Freezer	_____(10)	
7. Other_____		0

G. Home Entertainment Equipment?		
1. None	_____(0)	
2. Radio	_____(2)	
3. Stereo/Cassette (Portable)	_____(4)	
4. Television	X (6)	
5. Console Stereo Player	_____(8)	
6. Electric Musical Instruments	_____(10)	6
7. Other _____		

H. House Water Equipment?		
1. None	_____(0)	
2. Manual House Well	X (2)	
3. Diesel Pump Water Well	_____(4)	
4. Electric Pump Water Well or Municipal Pump System	_____(6)	
5. Limited Hot Water Equipment	_____(8)	
6. Central Hot Water Equipment	_____(10)	2
7. Other_____		

I. Farm Homecraft Production Equipment?		Value
1. None	____(0)	
2. Electric Equipment, Less 1,000 Watts	____(2)	
3. Electric Equipment, 1,000 Watts to 2 HP	____(4)	
4. 2 to 5 HP, Total Equipment	X (6)	
5. 6 to 10 HP, Total Equipment	____(8)	
6. Over 10 HP, Total Equipment	____(10)	6
7. Other _____		

J. Temperature Control Appliances?		
1. None	____(0)	
2. Fireplace or Small Floor Fan	X (2)	
3. Wood Stove or Large Floor Fan	____(4)	
4. Oil Stove or Ceiling Fan	____(6)	
5. A/C Unit-or Space Heating Unit	____(8)	
6. Central Home Heating or A/C	____(10)	2
7. Other _____		

K. Composite Level?	
A. Through J. Above	48

VII. HOUSEHOLD LEVEL EV''UATION FORM

			Value
A.	Means of Transportation?		
	1. None	_____(0)	
	2. Animal, Bicycle	__X__(2)	
	3. Animal Drawn Vehicle	_____(4)	
	4. Reliable/Regular Public Transportation (Train and/or Bus)	_____(6)	
	5. Motor Bike/Motor Cycle	_____(8)	
	6. Jeep, Automobile, Truck	_____(10)	__2__
	7. Other_____		
B.	Sanitary Facilities?		
	1. None	_____(0)	
	2. Open Air Place	_____(2)	
	3. Latrine, Wood Floor	__X__(4)	
	4. Latrine, Cement Floor or With Running Water		
	5. Toilet	_____(8)	
	6. Toilet with Septic Tank	_____(10)	__4__
	7. Other_____		
C.	Material of Living Room Floor?		
	1. Earth	_____(0)	
	2. Boards	_____(2)	
	3. Cement	_____(4)	
	4. Wood	__X__(6)	
	5. Tiles	_____(8)	
	6. Quality Carpeting	_____(10)	__6__
	7. Other		

			Value
D.	Bathing Facilities?		
	1. River, Creek, Public Facilities	_____(0)	
	2. Shower Using Gourd, Hose, Outside	X (2)	
	3. Shower Using Gourd, Hose, Inside	_____(4)	
	4. Shower with Cold Water	_____(6)	
	5. Shower with Hot Water	_____(8)	
	6. Shower and Bath Tub	_____(10)	2
	7. Other_____		
E.	Clothes Washing Facilities?		
	1. In the River	_____(0)	
	2. Washboard	_____(2)	
	3. Wash Tub	_____(4)	
	4. House Wash Basin	_____(6)	
	5. Hand Washing Machine	_____(8)	
	6. Automatic Washing Machine	_____(10)	4
	7. Other_____		
F.	Meat, Poultry, Fish Intake? (Dietary Sufficiency)		
	1. On Rare Occasions	_____(0)	
	2. Monthly	_____(2)	
	3. Twice a Month	_____(4)	
	4. Weekly	_____(6)	
	5. Every Other Day	_____(8)	
	6. Nearly Daily	_____(10)	8
	7. Other_____		

			Value
G.	Home Mass Media Exposure? (Each Check Equals Two Points)		
	1. Radio Listening	X (2)	
	2. Television Watching	X (2)	
	3. Newspaper	____ (2)	
	4. Books	X (2)	
	5. Magazine	X (2)	
	6. Other	____ (2)	8
H.	Role of Women/Women in Development (Each Check Equals Points Indicated)		
	1. No Activity Outside Family Circle	____ (0)	
	2. Shops Independently	X (2)	
	3. Participates in Community Service Activity	X (2)	
	4. Reads and Wrties	____ (2)	
	5. Voting Opportunity	X (2)	
	6. Professional Work Opportunity	____ (1)	
	7. Works as a Professional		
I.	Head of Household Service Participation? (Each Check Equals 1 Point)		
	1. Banking or Credit Services	____ (1)	
	2. Professional Doctor and/or Dentist	____ (1)	
	3. Commercial Transportation	X (1)	
	4. Postal, Telegraph or Telephone Service	X (1)	
	5. Training or Self-Improvement Courses	X (1)	
	6. Participation in Local Community/Service Organization	X (1)	
	7. Officer in Local Community/Service Organization	____ (1)	
	8. Participation in Local Government	____ (1)	
	9. Participation in National (Provincial) Service Organization	____ (1)	
	10. Officer in National (Provincial) Service Organization	____ (1)	4

J. Leisure Activity? (Each Check Equals 2 Points)		Value
1. Little or No Leisure Activity	____(0)	
2. Regular Nightly Visitation and Walks	____(2)	
3. (Local) Movie, Dances, Entertainment	X (2)	
4. Eating Out Locally	____(2)	
5. Out of Town Dining and/or Entertainment	X (2)	
6. Annual Family Vacation	____(2)	4
7. Other _____		
K. Composite Level (Total Value A through J above)		50
TOTAL SCORE (Totals of Sections VI & VII)		98
		======

COMPOSITE SCORE LEVEL - COOPESANTOS HOUSEHOLD SURVEY

(60 Interviews)

October 1978

ADOPTERS (49)

Energy Consumption Level	Level of Living	Composite Level
28	28	56
35	50	85
49	40	89
46	44	90
40	50	90
48	44	92
57	36	83
36	58	94
40	56	96
37	60	97
58	40	98
51	48	99
56	44	100
48	52	100
56	44	100
60	40	100
50	51	101
44	58	102
55	50	105
48	58	106
45	64	109
53	58	111
46	68	114
67	48	115
48	70	118
50	68	118
48	72	120
48	74	122
48	74	122
56	68	124
60	64	124
63	62	125
44	60	126
56	70	126
69	58	127
60	68	128
48	82	130
59	72	131
64	68	132
59	74	133

(Continued on next page)

COMPOSITE SCORE LEVEL - COOPESANTOS HOUSEHOLD SURVEY

(60 Interviews)

October 1978

ADOPTERS (49) (Continued from preceeding page)

Energy Consumption Level	Level of Living	Composite Level
64	74	138
60	80	140
68	82	150
62	90	152
65	88	153
66	90	156
69	88	157
68	90	158
74	94	168

INACCESSIBLES (4)

Energy Consumption Level	Level of Living	Composite Level
19	42	61
19	46	65
17	52	69
42	70	112

NON-ADOPTERS (7)

Energy Consumption Level	Level of Living	Composite Level
17	22	39
15	36	51
19	34	53
23	30	53
15	40	55
38	19	57
25	34	59

ENERGY CONSUMPTION LEVEL - COOPESANTOS HOUSEHOLD SURVEY

(60 Interviews)

October 1978

ADOPTERS (49)

28	48	51	59	65
35	48	51	59	66
36	48	53	60	66
37	48	55	60	67
40	48	56	60	68
40	48	56	60	68
44	48	56	62	69
45	48	56	63	69
46	49	57	64	74
46	50	58	64	

INACCESSIBLES (4)

17	19	19	42

NON-ADOPTERS (7)

15	17	23	25	38
15	19			

LEVEL OF LIVING SCORES - COOPESANTOS HOUSEHOLD SURVEY

(60 Interviews)

October 1978

ADOPTERS (49)

28	48	58	68	80
36	50	58	68	82
40	50	60	70	82
40	50	60	70	88
40	50	62	72	88
44	52	64	72	90
44	56	64	74	90
44	58	68	74	90
44	58	68	74	94
48	58	68	74	

LEVEL OF LIVING SCORES - COOPESANTOS HOUSEHOLD SURVEY

(60 Interviews)

October 1978

INACCESSIBLES (4)

42	46	52	70	

NON-ADOPTERS (7)

19	30	34	36	40
22	34			

Note: Highest Level Attainable in Energy Consumption Category is 94
Highest Level Attainable in Level of Living Category is 100

ANALYSIS BY QUARTILES - COOPESANTOS HOUSEHOLD SURVEY

OCOTBER, 1978

Quartiles	1	2	3	4
Composite Level	1 - 48	40 - 97	98 - 146	147 - 194
Energy Use Level	1 - 24	25 - 47	48 - 72	73 - 94
Level of Living	1 - 25	26 - 50	51 - 75	76 - 100

COMPOSITE LEVEL

Non-Adopters (7):	0 Fall in 4th Quartile	0%
	0 Fall in 3rd Quartile	0%
	6 Fall in 2nd Quartile	86%
	1 Falls in 1st Quartile	14%
Inaccessibles (4):	0 Fall in 4th Quartile	0%
	1 Falls in 3rd Quartile	25%
	3 Fall in 2nd Quartile	75%
	0 Fall in 1st Quartile	0%
Adopters (49):	7 Fall in 4th Quartile	14%
	32 Fall in 3rd Quartile	65%
	10 Fall in 2nd Quartile	21%
	0 Fall in 1st Quartile	0%

ENERGY CONSUMPTION LEVEL

Non-Adopters (7):	0 Fall in 4th Quartile	0%
	0 Fall in 3rd Quartile	0%
	2 Fall in 2nd Quartile	29%
	5 Fall in 1st Quartile	71%
Inaccessibles (4):	0 Fall in 4th Quartile	0%
	0 Fall in 3rd Quartile	0%
	1 Falls in 2nd Quartile	25%
	3 Fall in 1st Quartile	75%
Adopters (49):	1 Falls in 4th Quartile	2%
	38 Fall in 3rd Quartile	78%
	10 Fall in 2nd Quartile	20%
	0 Fall in 1st Quartile	0%

LEVEL OF LIVING

Non-Adopters (7):	0 Fall in 4th Quartile	0%
	0 Fall in 3rd Quartile	0%
	51 Fall in 2nd Quartile	71%
	2 Fall in 1st Quartile	29%

Inaccessibles (4):	0 Fall in 4th Quartile	0%
	2 Fall in 3rd Quartile	50%
	2 Fall in 2nd Quartile	50%
	0 Fall in 1st Quartile	0%
Adopters (49):	9 Fall in 4th Quartile	18%
	25 Fall in 3rd Quartile	57%
	15 Fall in 2nd Quartile	31%
	0 Fall in 1st Quartile	0%

APPENDIX E

ANALYSIS OF COOPESANTOS HOUSEHOLD SURVEY RESULTS BY LINE ITEM

OCTOBER, 1978

I. Energy Consumption

A. Energy Consumption Per Month

3 Households Spent	Less Than $2.00	5%
5 Households Spent	Between $2.00 & $3.99	8%
17 Households Spent	Between $4.00 & $6.99	28%
22 Households Spent	Between $7.00 & $9.99	37%
13 Households Spent	Over $10.00	22%

It is interesting to note that an oxcart of wood cost about ¢45.00, (US$5.23), and the average household uses from one to two oxcarts of wood per month, mostly for cooking.

B. Central Station Use of Electricity

1.	10 Households Had No Electric Service 3 Inaccessibles and 7 Non-Adopters	16.7%
2.	1 Household Had Limited Service A Gasoline Generator	1.7%
3.	49 Had 24 Hour Service and Basic Lighting	81.7%
4.	19 Had Electric Stoves	31.7%
5.	39 Had Electric Appliances	65 %
6.	28 Had Refrigerators	46.7%
7.	44 Had Home Entertainment Equipment	73.3%
8.	10 Had Hot Water Equipment	6.7%
9.	4. Had Productive Equipment	

*Figures may not add due to rounding

It is also interesting to note the following in this category:

Ten Households Scored One Point	16.7%
Three households Scored Two Points	5.0%
Six Households Scored Three Points	10.0%
Fourteen Households Scored Four Points	23.3%
Seven Households Scored Five Points	11.7%
Fourteen Households Scored Six Points	23.3%
Five Households Scored Seven Points	8.3%
One Household Scored Eight Points	1.7%

It was not possible to score more than eight points.

*Figures may not add due to rounding

C. Level of Lighting

3 Households Had Only Candles	5.0%
4 Households Had Limited Kerosene Lamps	6.7%
4 Households Had Kerosene Lamps Nightly	6.7%
49 Had Electric Lighting	81.7%

D. Cooking Facilities

35 Households Had Wood Stoves	58.3%
6 Households Had Propane Gas or Hotplates	10.0%
19 Households Had Electric Stoves	31.7%

E. Household Appliances and Home Repair Equipment

11 Households Were All Manual	18.3%
3 Households Had Flat Iron or Charcoal Iron	5.0%
16 Households Had Electric Irons	13.3%
8 Households Had Electric Kitchen Appliances or Hand Tools	26.7%
1 Household Had Electric Vacuum Cleaner	1.7%
21 Households Had Automatic Clothes Washers or Shop Equipment	35.0%

F. Food Preservation Appliances

None - 29	48.3%
Small Refrigerator (Kerosene) - 1	1.7%
Refrigerator - 30	50.0%

G. Home Entertainment Equipment

None - 2	3.3%*
Portable Radio - 13	21.7%
Stereo/Cassette, Portable - 2	3.3%
Television - 31	51.7%
Console Stero Play - 11	18.3%
Musical Instruments - 1	1.7%

*Figures may not add due to rounding

H. Home Water Equipment

50 With Municipal Water/Plumbing and Septic Tank	83.3%
10 With Limited Hot Water	16.7%

I. Farm Home Craft Production Equipment

52 With None	86.7%
4 With Less Than 1,000 Watts	6.7%
4 With Between 1,000 Watts and 2 HP	6.7%

Figures may not add due to rounding

J. Temperature Control Appliances

No use whatever -- no fireplaces, no fans, no heaters, no air conditioners

II. LEVEL OF LIVING

A. Means of Transportation

36 Have No Means	60 %
3 Have Animal or Bicycle	5 %
2 Have Motor Cycles	3.3%
19 Have Jeeps, Trucks or Autos	31.7%

B. Sanitary Facilities

4 Have Open Air Place	6.7%*
5 Have Latrine, Wood Floor	8.3%
17 Have Latrine, Cement Floor	28.3%
2 Have Toilet Without Septic Tank	3.3%
32 Have Toilet With Septic Tank	53.3%

*Figure may not add due to rounding

C. Material of Living Room Floor

36 Have Boards	.60 %
1 Has Cement	1.7%
5 Have Wood	8.3%
18 Have Tiles	30.0%
0 Have Wall to Wall Carpeting	0.0%

D. Bathing Facilities

2 Use River	3.3%*
2 Use Gourd Outside	3.3%
2 Use Gourd Inside (Some Use Hoses)	3.3%
41 Shower With Cold Water	68.3%
13 Shower With Hot Water	21.7%
0 Have Central Hot Water	

*Figures may not add due to rounding

E. Clothes Washing Facilities

2 Have Washboard	3.3%*
1 Has Washtub	1.7%
40 Have House Wash Basin Wint Plumbing	66.7%
1 Has Hand Washing Machine	1.7%
16 Have Electric Clothes Washer	26.7%

*Figures may not add due to rounding

F. Meat, Poultry, Fish Intake

8 On Rare Occasions	13.3%
4 Once A Month	6.7%
3 Twice A Month	5.0%
20 Twice A Week	33.3%
11 Every Other Day	18.3%
14 Almost Every Day	23.3%

Figures may not add due to rounding

G. Home Mass Media Exposure

60 Households Listen to Radio	100.0%
40 Households Watch Television	66.7%
27 Read Newspapers	45.0%
40 Read Books	66.7%
27 Read Magazines	45.0%

It is interesting to note that in this category:

One Household Had 0 Points - No Exposure	1.7%
Seven Households Had 2 Points	11.7%
Eight Household Had 4 Points	13.3%
Fifteen Households Had 6 Points	25.0%
14 Households had 8 Points	23.3%
15 Households Had 10 Points	25.0%

H. Role of Women/Involvement (Level)

2 Women - Shop Independently	3.3%
1 Woman - Community Service	1.7%
54 Women - Vote (all C. R. of Majority Age Can Vote)	90.0%
3 Women - Work Professionally	5.0%

I. Head Of Household Service Participation

22 Have Banking or Credit Serives	36.7%
11 Have Professional Doctor or Dentist	18.3%
27 Have Participated in Training or Self-Help Courses	45.0%
48 Use Inter-City Transportation	80.0%
41 Use Telephone, Telegraph or Postal Service	68.3%

In This Category:

One Head of Household Had 0 Points	1.7%
Nine Had 2 Points	15.0%
Twenty-One Had 4 Points	35.0%
Eighteen Had 6 Points	30.0%
Eight Had 8 Points	13.3%
Three Had 10 Points	5.0%

J. Leisure Activity

17	Little Leisure Activity	28.3%
12	Regular Nightly Visitation and Walks	20.0%
9	Movie, Dance, Local Entertainment	15.0%
1	Eating Out	1.7%
6	Out of Town Entertainment	10.0%
15	Annual Family Vacation	25.0%

PROJECT AND ACTUAL SALES (MWH)
By Category

COOPESANTOS

CATEGORY	1970	1971	1972	1973	1974	1975	1976	1977
Residential & Small Commercial								
Projected	3447	3787	4142	4571	4957	5420	5902	6402
Actual	1586	2108	2557	2830	3285	3754	4432	5461
Industrial								
Projected	2266	2548	2330	3112	3394	3677	3960	5461
Actual	2201	2094	2558	2866	3789	3742	3991	3660
Public Lighting								
Projected	399	419	440	462	485	509	534	561
Actual	139	181	202	205	204	222	247	260

Projections: From Glenn R. Benjamin Study

Actual: From ICE and Cooperative's Reports

APPENDIX F-2

MAXIMUM DEMAND ACCOUNTS - COOPESANTOS
San Marcos de Tarrazu, COSTA RICA

NAME OF ACCOUNT	TYPE OF BUSINESS	KWH USED IN 1977
Abdenago Monge Umana San Marcos de Tarrazu	Concrete Blocks Building Material	4,211
Water & Sewer Agency (SNALL Frailes de Sesamparados	Water Facilities Sewage Facilities	20,790
Beneficio San Andres, S. A. San Andres de Leon Cortes	Coffee Processing Plant	1,280
Cafetalera Tarrazu, Ltda. San Marcos de Tarrazu	Coffee Processing Plant	132,960
Cafetalera Tarrazu, Ltda. San Pablo de Leon Cortes	Coffee Processing Plant	27,680
Cooperativa de Caficultores de Jorce, R. L. Vuelta de Jorce de Aserri	Coffee Processing Plant	123,680
Cooperativa de Caficultores de Dota, R. L. Santa Maria de Dota	Coffee Processing Plant	101,040
Cooperativa de Caficultores de Tarrazu, R. L. San Marcos de Tarrazu	Coffee Processing Plant	342,560
Empresa Constructora Rafael Herra (FELUCO) Santa Maria de Dota	Road Construction Firm	18,476
Hacienda Cafetalera Santa Elena, S. A. Santa Elena de Cartago	Coffee Processing Plant	217,440
Ministerio de Obras Publicas y Transportes Santa Maria de Dota	Government Roadbuilding and Maintenance Ministry	6,426

MAXIMUM DEMAND ACCOUNTS - COOPESANTOS

NAME OF ACCOUNT	TYPE OF BUSINESS	KWH USED IN 1977
Roberto Montero Castro Palmichal de Acosta	Coffee Processing	76,160
Sociedad Agricola de Monterrey, S. A. Monterrey de Aserri	Coffee Processing	44,000
Zeledon & Co., Roberto Zeledon, Ltda. Monte Redondo de Aserri	Coffee Processing	109,200
Cordeles y Textiles, S. A.	Multiple - Manila Rope, Nylon Rope, Sacks, Plastic, Furniture, Wooden Furniture, Wooden Building Materials, etc.	2,283,200

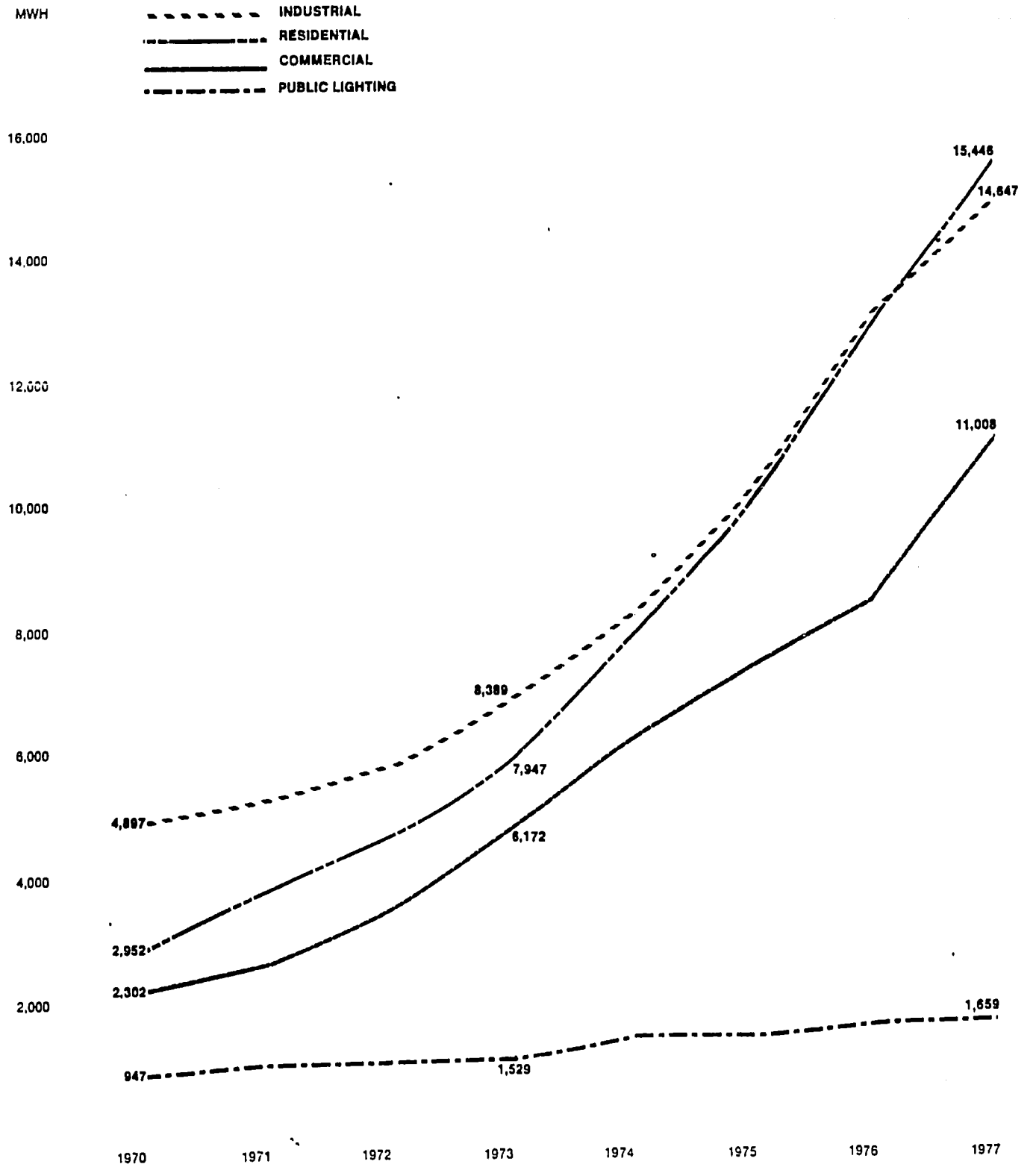
COSTA RICAN RURAL ELECTRIC COOPERATIVES

Coopesantos—Coopelesca—Coopeguanacaste

Composit Sales (MWH)—By Category

SOURCE: COOP & ICE Records

GRAPH #1

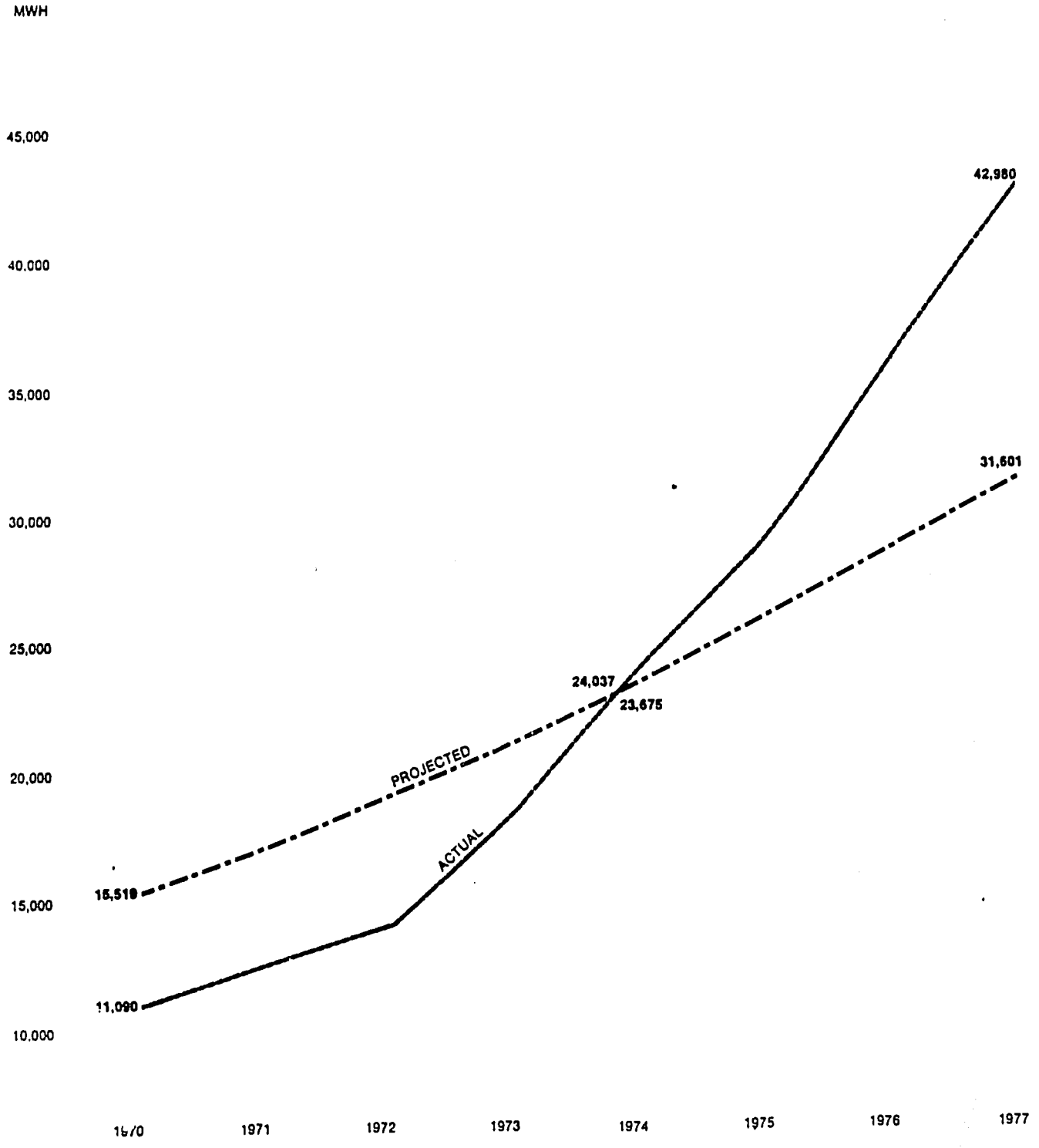


GRAPH #2

COSTA RICAN RURAL ELECTRIC COOPERATIVES
Coopesantos—Coopelesca—Coopeguanacaste
Projected and Actual Sales (MWH)—Gross

PROJECTIONS: Benjamin Study

ACTUAL: COOP AND ICE RECORDS

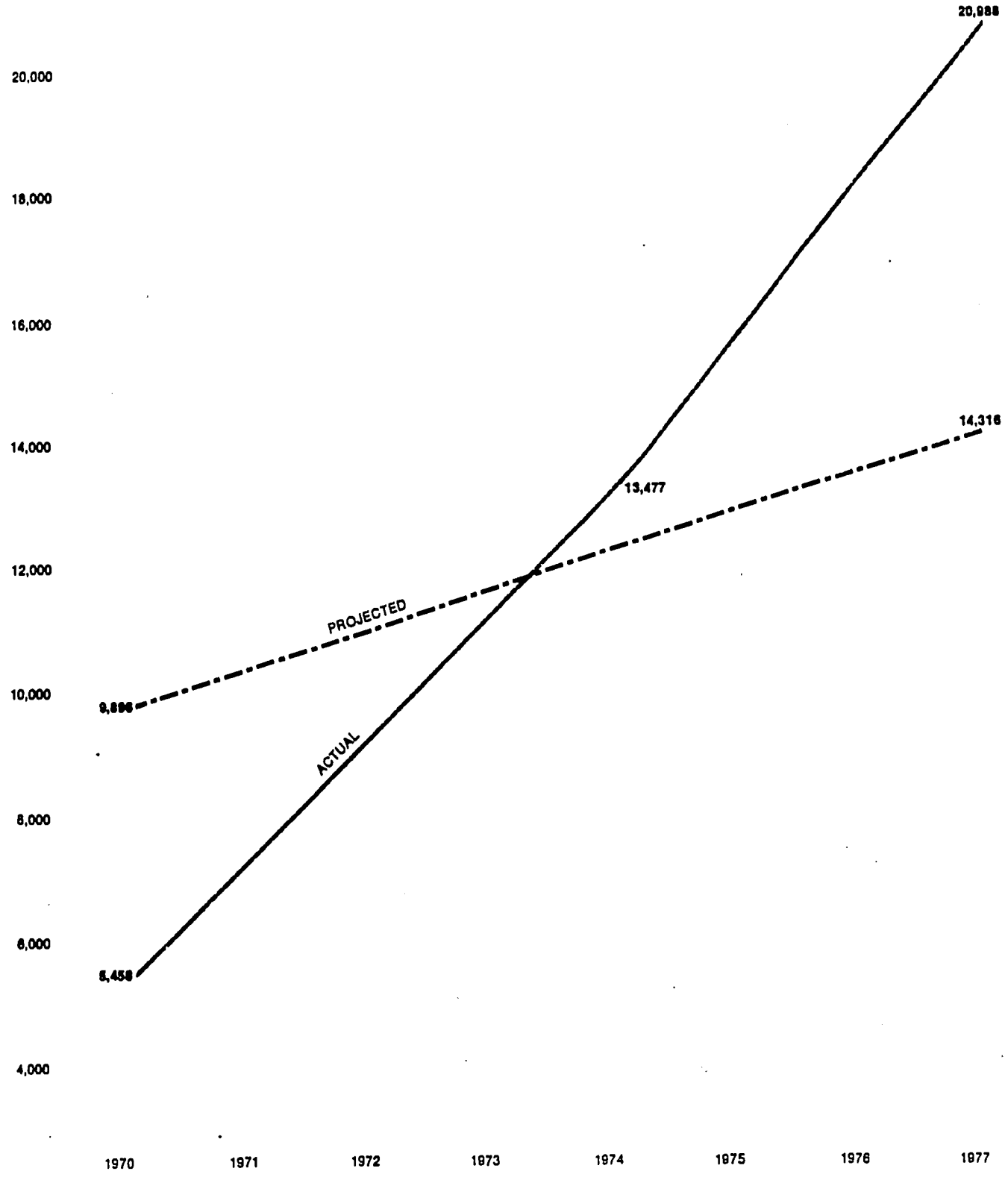


GRAPH #3

COSTA RICAN RURAL ELECTRIC COOPERATIVES
Coopesantos—Coopelesca—Coopeguanacaste
Projected and Actual Meter Connections

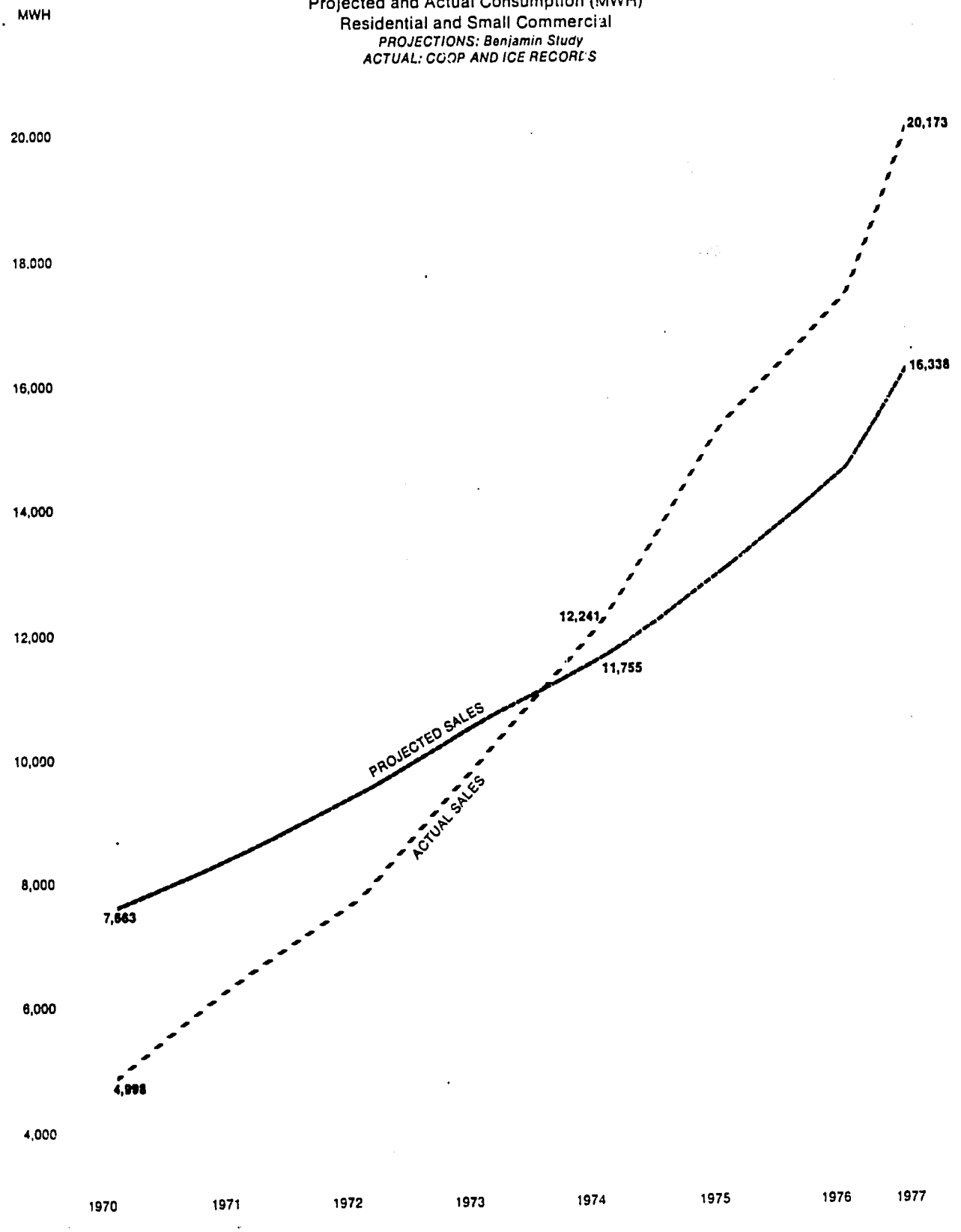
PROJECTIONS: Benjamin Study 1963-1964

ACTUAL: COOP AND ICE RECORDS—1970-1977



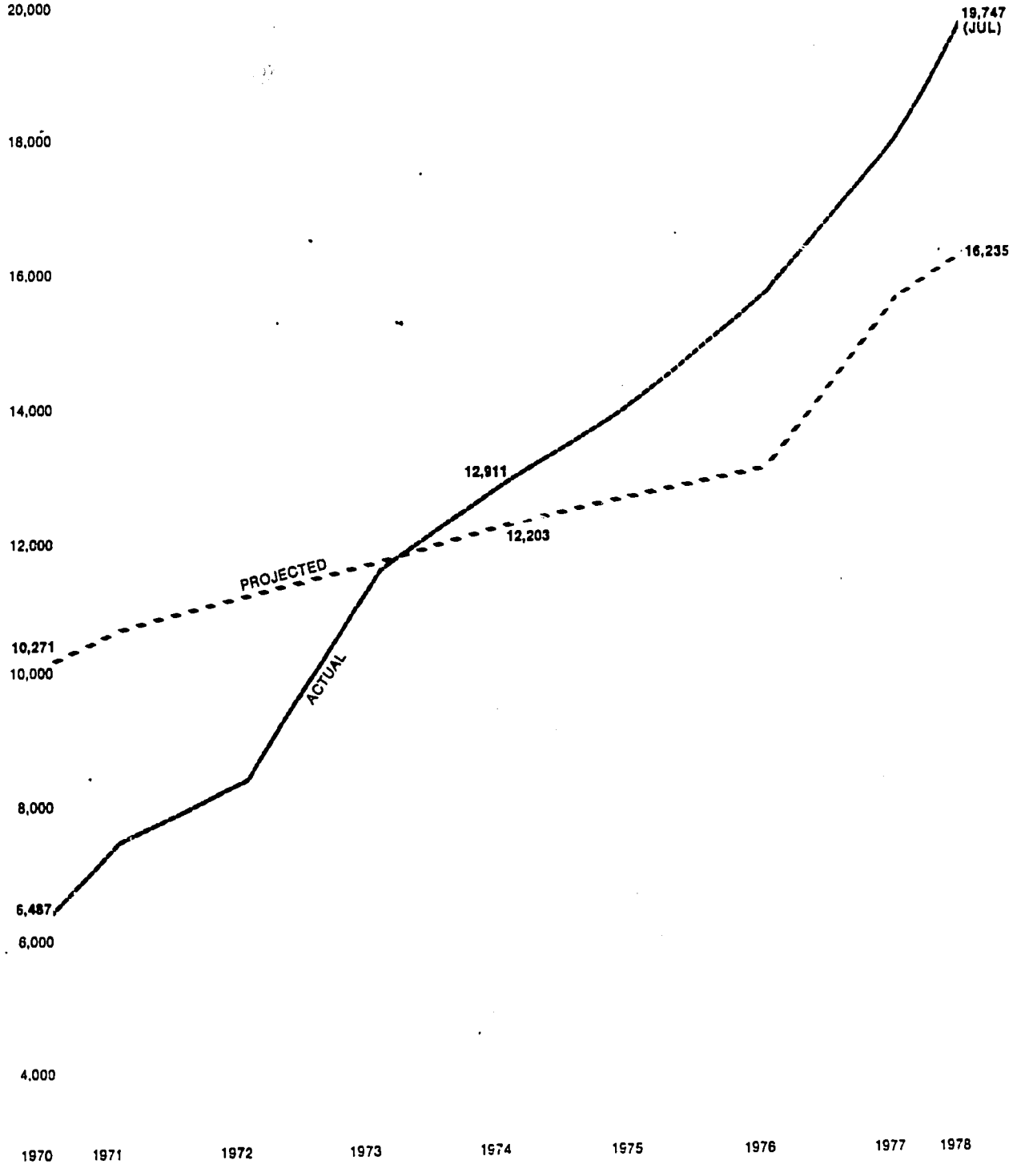
GRAPH #4

COSTA RICAN RURAL ELECTRIC COOPERATIVES
Coopesantos—Coopelesca—Coopeguanacaste
Projected and Actual Consumption (MWH)
Residential and Small Commercial
PROJECTIONS: Benjamin Study
ACTUAL: COOP AND ICE RECORDS



GRAPH #5

COSTA RICAN RURAL ELECTRIC COOPERATIVES
Coopesantos—Coopelesca—Coopeguanacaste
Projected and Actual Consumers
Residential and Small Commercial
PROJECTIONS: Benjamin Study
ACTUAL: COOP AND ICE RECORDS



APPENDIX H

REFERENCES USED IN COMPILING REPORT

Records and Files of the Cooperative, San Marcos

Informe de Operacion de las Principales Empresas Productoras y Distribuidoras de Energia Electrica, Anos 1972, 1975, y 1977, Instituto Costarricense de Electricidad, Direccion de Electrificacion, San Jose.

Engineering and Economic Feasibility Study for Three Pilot Projects of Rural Electric Cooperatives in Guanacaste, Tres Amigos and Los Santos, Costa Rica, Central America, by Glen R. Benjamin, Specialist in Rural Electrification, Under Contract from USAID, San Jose, Costa Rica, November 11, 1964.

Viabilidad Economica y Organizacion Administrativa y Contable de Tres Cooperativas de Electrificacion Rural, Graduate Thesis of Jorge Luis Maroto Casorla, Universidad de Costa Rica, Faculty of Economic Sciences, San Jose, Costa Rica, October, 1974.

Various Unites of the 1973 Costa Rican Census Reports.

APPENDIX I.1

OPERATING STATEMENT
COOPESANTOS
San Marcos de Tarrazu, Costa Rica
Status as of September 30, 1977

Liquidation of Excesses and Losses as of September 30, 1977.

81 - Sales of Electricity	₡3,161,056.11	($367,564.66)*		
82 - Other Electric Sales	21,583.95	(2,509.77)		
TOTAL INCOME			₡3,182,640.06	(370,074.41)
91 - Purchase of Energy	1,596,438.67	(185,632.39)		
93 - Billing and Collection Expense	266,497.46	(30,988.08)		
95 - Distribution Expense	600,745.58	(69,854.14)		
96 - Substation Expense	84,441.29	(9,818.75)		
97 - General Administrative Expense	308,269.75	(35,845.32)		
98 - Financing Expense	196,929.18	(22,898.74)		
TOTAL EXPENSES			3,053,321.93	(355,037.43)
Total Excess - Fiscal 1976/1977			129,318.13	(15,036.99)
2% s/Law 5185			2,586.36	(300.74)
Excess			126,731.77	(14,736.25)
Education Reserve - 5%			6,336.58	(736.81)
Legal Reserve - 10%			12,673.17	(1,473.62)
Reserve for Social Provision - 6%			7,603.92	(884.18)
NET EXCESS			100,118.10	(11.641.64)

*Exchange Rate 8.60 Colones to One U. S. Dollar (US$1.00) - Dollar Figures may not add due to rounding.

APPENDIX I-2

BALANCE STATEMENT
COOPESANTOS
San Marcos de Tarrazu, Costa Rica
Status as of September 30, 1977

ASSETS

Fixed Assets			¢11,034,945.83	(1,283,133.11)*
Distribution Plant	11,607,854,57	(1,349,750.51)		
Depreciation	2,080,179.94	(241,881.38)		
			9,527,674.63	(1,107,869.10)
Substation Reducer	601,332.43	(69,992.38)		
Depreciation	160,951.50	(18,715.29)		
			440,380.93	
General Plant	1,486,752.01	(172,878.13)		
Depreciation	463,165.21	(53,856.42)		
Work in Construction			1,023,586.80	(120,068.25)
			43,303.47	(5,035.29)
CURRENT ASSETS			2,626,109.79	(305,361.62)
Cash on Hand and Money in Bank			240,817.63	(28,002.05)
Cash on Hand	2,113.50	(245.76)		
Money in Bank	238,704.13	(27,756.29)		
Liquid Assets			2,385,292.16	(277,359.54)
Consumer Accounts Receibable	340,354.10	(39,574.06)		
Other Accounts Receibable	213,494.26	(24,824.13)		
Transitory Investments	366,493.75	(42,625.55)		
Materials Inventory	1,454,271.91	(1,241.64)		
Other Assets			145,925.93	(16,968.13)
Permanent Investments	48,000.00	(5,581.40)		
Prepaid Expenses	94,100.93	(10,941.97)		
Various Other Assets	3,825.00	(444.77)		
TOTAL ASSETS			¢13,906,981.55	(1,605,463.00)

DEBITS

Long Term Debt			7,782,276.61	(904,915.93)
Mortgages	7,466,466.19	(868,191.40)		
Ark. Electric Co-op, Inc.	315,830.42	(36,724.47)		

Short Term Debt				
Op. AID L-15	266,321.96	(30,967.67)		
Ark. Elec. Co-op	53,851.27	(6,261.78)		
Consumer Depreciation	36,649.70	(4,261.59)		
Accounts Payable	84,720.56	(9,851.23)		
Other Short Term Dept	196,469.58	(22,845.30)		
Accumulated Payments	168,301.36	(19,569.93)		
Savings Fund and Guarantee	25,134.65	(2,922.63)		
TOTAL DEBITS			8,672,086.90	(1,008,382.1
PATRIMONY				
Subscribed Capital	373,150.00	(43,389.53)		
Patronage Capital	3,457,094.20	(401,987.69)		
Subscribers	1,071.45	(124.59)		
		3,799,172.75	(441,764.27)	
Legal Reserve		23,448,38	(2,726.56)	
Welfare Reserve		9,772.55	(1,136.34)	
Donation Capital		985,030.37	(114,538.41)	
Education Reserve		132,465.44	(15,402.96)	
Excesses and Losses		155,005.07	(18,023.84)	
Period 1975/1976	54,886.97	(6,382.21)		
Period 1976/1977	100,118.10	(11,641.64)		
TOTAL PATRONAGE			5,134,894.56	(597,080.
TOTAL DEBITS AND CAPITAL			₡13,806.981.55	($1,605,463.

APPENDIX I.3

SOME RATIOS - COOPESANTOS
San Marcos de Tarrazu, Costa Rica

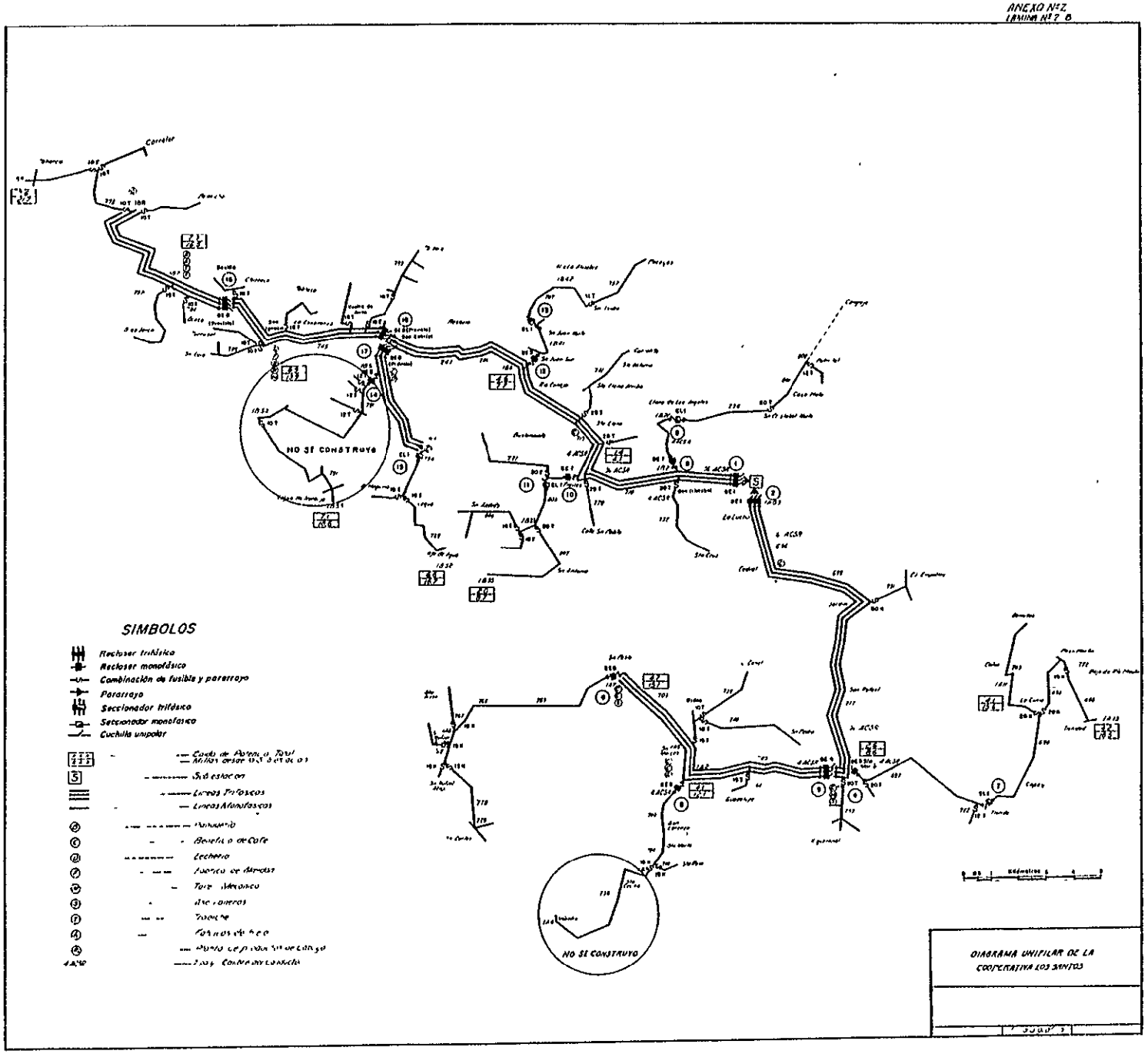
September 30, 1977

Direct and Indirect Costs of Purchase Energy Compared to Volume of Operations

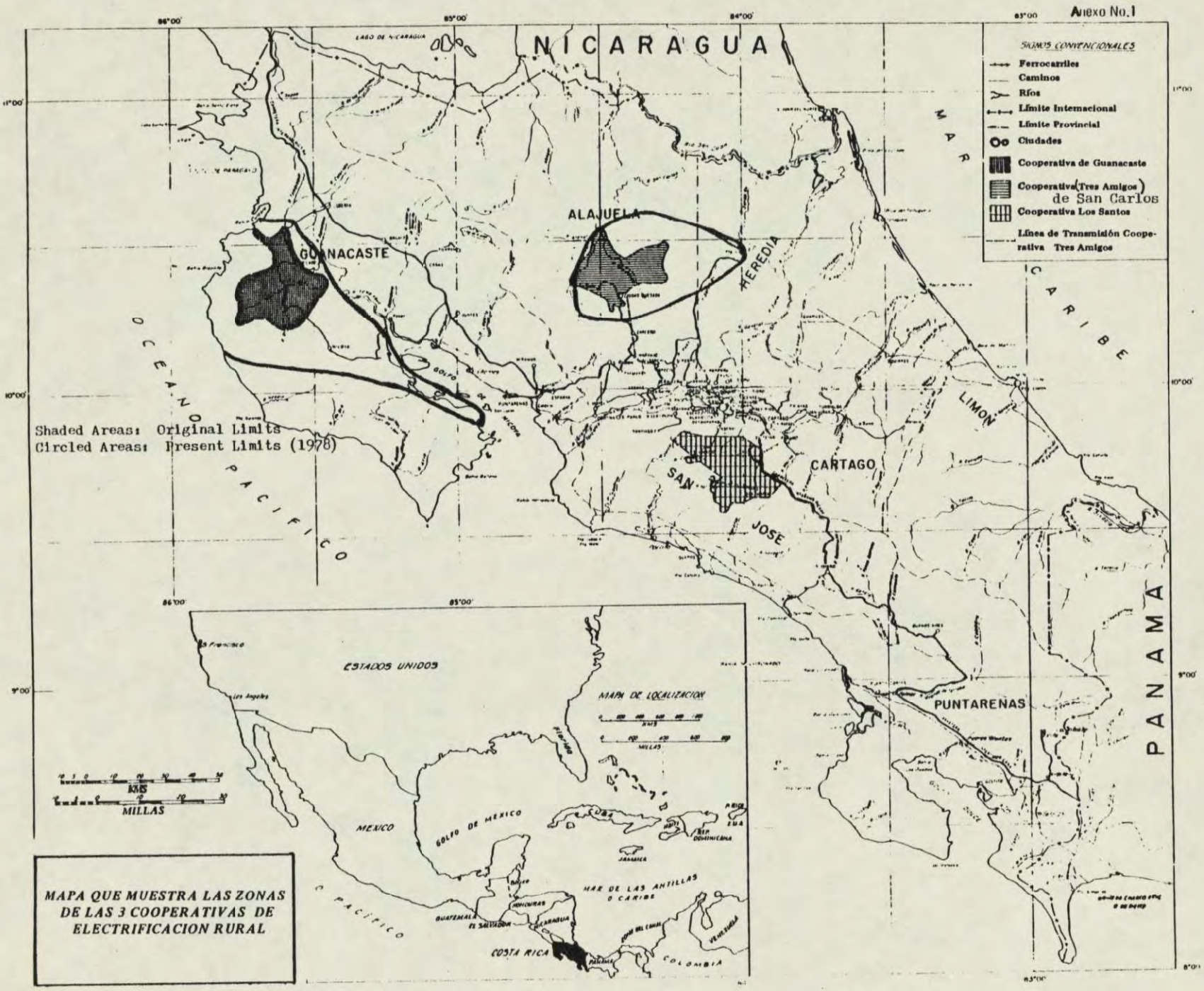
	1974-1975	1975-1976	1976-1977
Purchases / Sales	940,886 (₡109,403)* / 2,332,473 (271,218) = 40.7%	1,128,632 (131,236) / 2,699,191 (313,859) = 41.8%	596,438 (185,632) / 3,161,056 (364,076) = 50.5%
Operating Expenses / Sales	948,876 (11,033) / 2,332,473 (271,218) = 40.7%	1,099,811 (126,606) / 2,699,191 (313,859) = 40.3%	1,259,000 (146,395) / 3,161,056 (364,076) = 39.8%
Financing Expense / Sales	85,970 (9,996.51) / 2,332,473 (271,218) = 3.6%	119,167 (13,857) / 2,699,191 (313,859) = 4.4%	196,929 (22,899) / 3,161,056) (313,859 = 6.22%

*Exchange Rate: 8.60 Colones (₡) to one U. S. Dollar ($1.00) - Dollar figures may not compute same percentages due to rounding.

Source: 1978 Co-op Annual Report to Membership.



APPENDIX J.1 - Line Diagram - COOPESANTOS Electric System - Projected in 1964 Benjamin Study



APPENDIX J.2 - Map of Costa Rica - Location of the Three AID-Funded Rural Electric Cooperatives