



International Science and Technology Institute, Inc.

DRAFT

**EVALUATION OF RURAL ELECTRIFICATION I
(OUTER ISLANDS), INDONESIA**

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I. EXECUTIVE SUMMARY

The Problem. The Government of Indonesia desires to provide electricity to rural populations; to improve the quality of life of farmers and others; and to stimulate decentralized economic development. Normally, extension of electricity to such areas would be the responsibility of PLN (State Electricity Company). PLN does have decentralized power generation in areas far from the main grids - including in two of the three sites of this project. In those three sites, rural areas off Java, it was decided, however, to create three rural electric cooperatives to generate and distribute power. These cooperatives ("coops") are experimental, in that they act outside the normal habit of Indonesia coop activity - agriculture and fishing. They receive guidance and are under the tutelage of a Project Development Office (PDO) in Jakarta, within the Ministry of Cooperatives, and set up specifically for this purpose. Underlying this new approach (in Indonesia) to rural electrification are the beliefs that coops offer special advantages; that electricity to be provided is affordable by local populations; that electric coops can be effectively managed and developed; and that the project as a whole will be financially viable.

U.S. Assistance. The project is a multidonor effort, with AID financing procurement of distribution and housewiring materials and associated tools and equipment; providing technical assistance in organization, management and operations of the three coops; and in procurement, engineering design, and construction. The U.S. grant portion is \$6.5 million (signed 3/30/78), including a portion of the additional \$2 authorized in June, 1982, and the loan portion is \$10 million (5/6/78). Other donors are CIDA (\$22.15 million), and GOI (initially \$17 million, now at least \$26 million). The AID project numbers are 497-0267 (Grant) and 497-T-052 (Loan). Host country counterpart agency is: Directorate General of Cooperatives (DGC). U.S. contractors are National Rural Electrification Cooperatives Association (NRECA) for technical assistance in training, operations and management; and C.T. Main, Inc. for assistance in design and construction.

Purpose of Evaluation. The Terms of Reference basically seek to answer the following questions: How well does the new cooperative system work in practice? What are the shortcomings, and what should be done about them? Are the coops viable financially? Is the electricity affordable, particularly by the poor? Is it being used productively? What critical elements of project design and implementation affected the outcome of this project? What are the policy implications for rural electrification (RE)?

Previous Evaluations. The team has read three previous evaluations: June 12, 1980 (John McCarthy, ASIA/DP/PL), June 25, 1980 (David Devin, USAID/Jakarta) and July ____, 1981 (no date given) (Robert C. Johnson, AID Jakarta). These reports were valuable sources of information, and helped point the way for the team's research.

Methodology Used; Obstacles. Prior to departure from the U.S., the team developed methodological guidelines, in consultation with an AID ad hoc working group, headed by Ms. Maureen Norton. The guidelines are attached to the Report. Not all these guidelines proved to be relevant. In Indonesia, interviews were held with many persons, Indonesian and foreign, with direct if indirect roles in the project. All three sites were visited; file documents were perused. A few households at each site were visited.

Findings. Status of the Project. The project exhibits grave delays totalling about two years thus far. Grant funds are running out, costs of generating facilities have soared, and the project has hardly begun. No meaningful generation of power exists. The Coops and PDO cannot be self-sufficient institutions until the projected RE system is completed and operating.

Project Design. The original project design was based on faulty economic analysis and overoptimistic assumptions. It has long been abandoned as a baseline document. No new feasibility analysis has been done.

Project Impact. Impact has been minimal thus far. However, very high local expectations have been raised, both among householders and small commercial/industrial establishments, because of the demonstration projects now in place.

Institutional Strength-PDO. The PDO Director is capable and dedicated. He cannot accomplish all that is demanded of him, partly because his staff has been decimated by internal GOI funding cuts which arose because of delays in project implementation. Trained personnel have returned to other jobs or left the government. The staff can be rebuilt, but additional technical assistance will be required.

Institutional Strength-Coops. The coops are very weak in management, but in the Indonesian context, and considering that the project has not yet really begun, they offer a possibility for providing good, locally managed service. Time, patience and assistance are needed. The coops will probably never be democratically run on the U.S. model chosen.

Financial Viability of Coops. It is highly doubtful that the coops will ever be more than marginally financially viable, even if a successful productive uses program is developed. But such a program could have a beneficial impact on development, particularly in Lampung and Lombok. Removing diesel subsidies would further adversely affect the coops' financial position.

Affordability of Electricity. Presently a wide range of income levels appears to be served, but even a small upward revision of tariffs would drastically affect this picture in Lampung and Lombok, unless accompanied by a downward revision of fixed monthly charges. Householders in those two areas reduce the level of lighting to as low as 45W or even 15W total. In Luwu, where kerosene is much more expensive, every house within reach of lines is electrified. Absolutely no reliable income data are available for any of the three project areas.

Effectiveness of NRECA. Excellent work done in training and procedures; the impact has been dissipated due to delays, turnover in coop staff, and other exogenous factors. Management could have been much more aggressive in pursuing project aims. Effectiveness of field personnel has been greatly hampered by inability to speak even rudimentary Indonesian, and in one location by a passive attitude. Ability to influence adverse events in the field has been nil or low.

Role of AID Jakarta. AID project monitoring and engineering personnel were aware of problems of communication and performance of the U.S. contractors from mid-1979 on (cf. Devin report, p.27), and tried energetically to meet them; needed changes in contractor personnel took some two years to bring about.

Relative Importance of Sites. Relative importance of sites to the overall project appears to be determined in part by ease of access. Luwu area, a major transmigration area with a substantial commitment of funds from GOI in infrastructure and agriculture, should not be neglected because of its relative isolation. To do so would lessen the experimental nature of the project.

Project Design and Policy Implication. Future RE projects call for much more rigorous feasibility analysis and planning. No definitive policy conclusions can be drawn at this early stage of the project.

Recommendations. Seven person-years of additional technical assistance to provide site support, central management support, and develop productive uses program; the impact on present staffing would be as follows:

<u>NRECA:</u>	Schroff - additional 7 months (to end 1984)
	Sansing - additional 8 months (to end 1984)
<u>either</u>	Adkins - additional 17 months (to end 1984)
<u>or</u>	DeFoor - additional 21 months (to end 1984)
<u>PDO:</u>	Management Advisor - 24 months (can be AID direct hire)
	Productive Uses Consultant - 24 months (can be AID direct hire)
Total	6.6 person-years (if Adkins is retained)
	7 person-years (if DeFoor is retained)

Major productive uses effort, affordability survey in all three areas by new AIC contractor. Indonesia language study required for all field staff. AID monitoring expanded to include Indonesian-speaking development expert. Independent evaluation six months after 500 KW interim power units are supplied (est. 3/83). Lower coop monthly base charges and raise rates to current PLN level, to enhance affordability and acceptance.

Basic Program Identification Data

1. Country: Indonesia
2. Project Title: Rural Electrification I
3. Project Number: 497-0267 (Grant); 497-052 (Loan)
4. Project Dates:
 - a. Project Paper 8/08/77 (USAID Jakarta)
 - b. Interim Generation Units: Projected for 1st Quarter 1983
5. Program Funding:
 - a. USAID Grant Funding \$6.5 million — PDo component only.
 - b. USAID Loan Funding \$10 million
 - c. CIDA Projected Funding ~~\$22.15 million~~
 - d. GOI Funding (initial) \$37 million; (projected additional) \$9 million
6. Mode of Implementation: Technical Assistance in Training, operations and Management provided by National Rural Electric Cooperatives Association (NRECA); Design and Construction Services by C.T. Main, Inc.
7. Project Design: NRECA International Consulting Services
8. Responsible Mission Officials:
 - a. Mission Director: Thomas C. Niblock (4/77-1/81); Robert Simpson (Acting) (4/81-1/82); William P. Fuller (1/82-present)
 - b. Project Officers: (in chronological order), D. Woody; Robert C. Johnson; David Devin; James D. Baird
9. Previous Evaluation and Review:
 - a. AID Trip Report/Evaluation, John McCarthy (ASIA/DP/PL), June 12, 1980 approved March 31, 1982.
 - b. AID Jakarta Internal Evaluation, Robert Johnson, July ____, 1981, approved March 31, 1982.
 - c. AID Jakarta Internal Evaluation, Dave Devin, June 12, 1980.
10. Host Country Exchange Rates:
 - a. Currency: Rupiah
 - b. Exchange Rate at Time of Evaluation: \$1 = Rp.653
Exchange Rate at Time of Project Paper: \$1 = Rp.425

II. CONCLUSIONS AND RECOMMENDATION

1. Status of the Project

This project will not be able to meet the goals set forth in the original feasibility study. The original design was based on faulty economic analysis and overoptimistic assumptions. There have been numerous delays, involving GOI approval procedures and contractor performance. The project has had little impact to date, other than to raise expectations in each of the project areas. Unless continuing technical assistance is made available for a minimum period of two years, the project is not likely to survive in the form of independent rural electric cooperatives.

2. Institutional Aspects

A) COOPERATIVES. Coops offer the possibility of providing good, locally-managed service to customers. At present, coops are weak in management and administration. They do not yet resemble true independent cooperatives other than in a strictly formal sense. Four distinct sources of authority claim at least some measure of responsibility for running the coops: DGC Project Coordinator; PDO; Board of Directors; and Coop manager. Coop members have no role in coop affairs other than as customers.

B) PDO. PDO staffed for the project on time, but because of delays this turned out to be two years too soon. Flexibility to meet this situation was not available to PDO under Indonesian law and regulations. The staff, now decimated, is headed by a capable Director, and can be rebuilt with assistance.

C) USAID CONTRACTORS. Contractors' inadequacies were identified at an early date by AID Jakarta; however, delays were encountered in resolving problems associated with contractor performance.

RECOMMENDATION: To maximize the potential of PDO and Coops, additional technical assistance should be furnished as follows:

A. Project Management Coordinator as Executive Assistant to Director of PDO. Length of assistance: Two Years. Experience in developing countries essential. Knowledge of Indonesian highly desirable. Accounting experience highly desirable. RE experience desirable but not essential. Duties: work with and train his replacement; assume day-to-day responsibility for field liaison; represent Director, as requested in meetings with contractors; periodically assess coop performance and recommend actions to Director; assure that coop annual meetings are held and records kept; other management duties to be assigned by Director.

B. Site Advisors: Continued coverage to the end of 1984, by extending either Adkins (17 months) or DeFoor (21 months). The person chosen would serve Lombok and Luwu on a full time basis. Lampung would be served from Jakarta. Currently DeFoor is scheduled to leave Indonesia, March 1983 and Adkins, July 1983. All site advisers to be required by contract to study Indonesian to achieve 800 word capability soonest, and to continue study throughout stay.

3. Economic Viability and Affordability

A) It is highly doubtful that the coops, as envisaged in the original planning, will ever be more than marginally financially viable.

RECOMMENDATION: PDO should observe the financial performance of the project for a period of time following startup of full RE I power (i.e. 500 KW plus 2.1 MW units), prior to making any decision regarding future GOI investment in hardware.

B) The addition of an active and major productive uses program offers the promise of improved financial viability, and development benefits, and therefore should be high priority effort.

RECOMMENDATION: A productive uses specialist should be located at one project site - ideally Lampung - for two years. This person should be required to learn Indonesian to at least the 800-word level. He or she should travel extensively to other project regions to identify productive use possibilities, form capital and technology "packages," and get the program moving in cooperation with coop managers.

C) The team's analysis shows that, of households which now use .5 liters of kerosene or less per day for lighting, a substantial number are unlikely to be able to afford electricity without reducing consumption of some basic good. This analysis is partly based on random visits to a few households, review of existing studies, and other work. We feel that the project paper's basing financial feasibility on 50% household connections was probably very optimistic. Further study is required to reach a definite conclusion.

RECOMMENDATIONS:

- (1) Affordability study using one U.S. and one Indonesia consultant, total ten person/months.
- (2) Reduction of monthly base charges by coops coupled with tariff increase to at least the present PLN rate would enhance affordability and thus the number of household connections.

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III. THE PROJECT CONTEXT NEED FOR RURAL ELECTRIFICATION IN INDONESIA

The Government of Indonesia has adopted as a priority goal the improvement of the lot of rural people. Up to the time of this project's conception (1976), most of the efforts had concentrated on improving and expanding the rural and irrigation systems; extending the primary and secondary school systems; and investing in agricultural research. The present project is a part of one of the new initiatives being made on behalf of rural populations (the other important one involves rural health delivery). The GOI is placing heavy emphasis on providing electricity to rural populations. It is felt that electricity will enhance the quality of life for poorer people, and will stimulate new employment opportunities, and thus, rising incomes.

The experience of some developed and developing countries in the application of electric power in rural areas was cited by planners of the present RE project, who saw increased agricultural yields, lower crop losses, and new industry creation, plus numerous social benefits such as street lighting, refrigeration for health and food preservation, and others, as stemming directly from the availability of electricity.

The Government of Indonesia, through the State Electricity Enterprise (PLN), the Director General of Cooperatives (DGC), and the State Planning Board (BAPPENAS), requested AID technical and financial assistance for rural electrification as part of the US IGGI pledge for Indonesian concessionary aid for 1977-78.

IV. THE PROJECT:
RURAL ELECTRIFICATION I (OUTER ISLANDS)

RE I is presently planned to provide "areawide coverage" as follows:

<u>Site</u>	<u>Villages Served</u>	<u>Households Served</u>
Central Lampung	108	23,500
East Lombok	34	22,000
South Sulawesi (Luwu)	65	16,000
	<u>207</u>	<u>61,500</u>

The number of households is based on connecting 50% of all households within a five year period.

Power is to be provided initially by "interim" generation, by installing two 500 KW generators at each site, to be followed by two or three 2.1 MW units at each site. The Government of Indonesia is providing the 500 KW units; the Government of Canada (CIDA) the 2.1 MW units.

Delays have affected the original (1977) project timing. It was hoped that energizations could begin in the second quarter of 1979, though project planners appear to have realized that this was unlikely. An eventual (1979) implementation schedule was drawn up by DGC, NRECA, and C.T. Main, which called for installation of interim units in all three sites by the end of the 3rd quarter of 1980.

It now appears that the earliest feasible date for installation of these units will be in the 2nd quarter of 1983.

The 2.1 MW units were scheduled to be installed in the following quarters of 1981: 1st (Lampung); 2nd (Lombok); 3rd (Luwu). Invitations for bids have not yet been issued by the Government of Canada, and it is estimated by the PDO Director that if IFB's were issued today (August 1982), the units would be in place and operating in August 1984. The project as a whole is thus two years behind schedule, to date.

AID has provided several small (100 KW) military surplus units to each site (plus smaller units for services to resident consultants and headquarters), to provide a temporary focal point for coop activity.

The coops are already established and staffed with persons trained by a US contractor, the National Rural Cooperatives Electrification Association (NRECA). Until July, 1982, an NRECA advisor was at each site; at that time a lack of funds required the withdrawal of full-time advisers from Lampung and Lombok. The site adviser in Luwu will remain until March, 1983. It is planned to have the present NRECA adviser to PLN spend 50% of his time covering Lombok from his base in Semarang, Central Java. Lampung would be covered by visits from Jakarta.

Construction design and engineering is provided by another US contractor, C.I. Main, Inc. which presently has resident consultants in all three project sites.

The present status of the project is summarized in the following table:

Present Status - RE I

	Lampung	Lombok	Luwu
Targeted Households*	23500		
Households Electrified Number (July 15, 1982)	1507	2246	738
Percent of Target	6.41	10.21	4.54
Capacity (KW)	475	550	510
KWH Billed Customer Charges	39,104 ¹	45,772 ³	13,026 ³
Housewiring (Rp)	8303 ⁴	7,000-13,500	10,000-12,000
Base Charge (Rp/m)	1600	975	1100
Tariff (Rp/KWH)	33.5	25 (up to 6 KWH) 30 (beyond 6 KWH)	45

Source:

Field Interviews, NRECA Monthly Team Reports and Monthly Financial of Statistical Reports.

1. May 1982
2. February 1982
3. June 1982
4. Estimated Average

*USAID target for electrical connection by PACD (Project Assistance Completion Date).

V. INSTITUTIONAL GROWTH OF PDO AND COOPS

5.1. Definition of Responsibilities: PDO and Coops

The responsibilities and authority of the PDO and coops are not adequately defined, and this is a source of dissatisfaction and tension in the coops. The legal basis for the coops is Law No. 12 of 1967. This law is basically designed to encourage local cooperative initiatives in agriculture and fishing. The present RE project is vastly larger and qualitatively very different from the activities undertaken by ordinary coops, and especially during project startup, the same rules of the game do not fit. The RE project, for example, will require substantial central government subsidies for several years, and it is normal for the central control. Centralized scheduling, planning engineering services, purchasing, and quality control all militate against local popular initiative. This causes local frustration, exacerbated by the severe delays the project has encountered. Further, the notion of independent electric coops presumes the right to set tariffs (subject to approval from a tariffs are set by the Directorate General of Power, Ministry of Power and Energy, and there is probably no chance whatsoever that individual coops will be permitted to raise their tariffs to levels deemed necessary by their Boards and managers.

A clear ministerial directive to the coops stating when and to what degree PDO tutelage will be relaxed could be helpful in the present situation.

5.1.1. Definition of Responsibilities: DGC Coordinator

The responsibilities of the DGC coordinator overlap those of the coop manager and Board of Directors, causing confusion, and diffusion of authority. It is a requirement of Indonesian law that, where ministries undertake development projects above a certain level of financial commitment, a project coordinator be appointed who is independent of project management, but who is responsible for seeing that GOI funds are correctly and appropriately disbursed. The practical effect of this on the present project varies according to location. In Lampung, where the coop has fairly good accounting capabilities, the DGC coordinator has not engaged in day-to-day management, and has been supportive regarding certain problems brought to his attention, in particular salary inequities (mentioned more fully elsewhere in this section). In the Luwu transmigration area, where there is no accounting capability and a weak coop manager, the DGC coordinator clearly controls important day-to-day decisions. The confidence of the manager is undercut, and his decisions are often reversed. In Lombok, the situation is between these two extremes.

5.2. Organizational Structure-PDO

The organizational structure of PDO is adequate to enable it to carry its responsibilities effectively.

5.2.2. Qualifications of Staff-PDO

Delays in the project have adversely affected both the numbers and qualifications of PDO staff. In its planning and after consultation with C.T. Main and CIDA, PDO budgeted 7% of construction costs for the fiscal year beginning April 1980.

PDO budgeted for, and increased its project staff to, a level of 107 persons for that period. Indonesian government procedure require a projection of costs for each project year which becomes a rigid figure. No flexibility is available to take account of unexpected delays. When it became apparent that construction would not take place at all during the planned time period, PDO was stuck with a large number of reported high quality professional personnel who had nothing to do. Indonesian law does not permit the laying off of government personnel. PDO tried to reduce staff as best it could. Some resigned and took other jobs. Some returned to positions whence they had been recruited. About 50 are still on hand. PDO lost its accountants; the present Assistant Chief for Administration and Finance, a key position, is an engineer acting as Financial Manager. The Section Head in charge of training, who is in a key position, is capable and has been strongly supported by NRECA.

5.2.3. Supervision-PDO

In some respects, PDO personnel receive too much supervision, in the sense that they are reluctant to take initiatives in the absence of prior approval from the PDO Director. This has been a source of repeated frustration to NRECA personnel. This situation, however, is not unusual in Indonesian organizations, and too much should not be made of it at this early stage of development. In time, it is likely that more initiative will be taken by at least some PDO personnel, particularly technical persons. One problem is that the Director is often not around at the moment when his approval is sought by his staff.

5.2.4. Timely Decisions

Management does not always make decisions in a timely manner. This is a particular complaint of the coops, though it is also heard at PDO headquarters. It has been thoroughly discussed with the Director as well as others. There appear to be four reasons for delay in decision-making:

- the Director simply has too many demands on his time, a common affliction of qualified senior personnel in Indonesia.
- some field correspondence sent by coop managers seeks approval of actions taken contrary to PDO instructions; these letters are sometimes not answered.
- some letters involve questions which are still under discussions in GOI (e.g. tariffs).
- some delay is due to contractor delay.

The problem of time demand is the most serious of these. In addition to being responsible for the success of the project, and to ensure that it is successful, the Director must deal with the following entities: BAPPENAS (State Planning Board); Sekneg (State Secretariat); Ministry of Finance; Bank Indonesia; Bank Rakyat Indonesia; Ministry of Cooperatives (at two levels); USAID; CIDA; NRECA; C.T. Main; and Sandwell (the Canadian consultant). The Director needs assistance in coordinating and directing the project as a whole, so that he can be freed from a host of daily operational problems. An Executive Assistant in whom he

and his Deputy could repose confidence for day-to-day routine decisions and delegation is badly needed. Given the difficulties of finding and recruiting such a person into government service at this time, a foreign consultant is suggested for this purpose in the Conclusions and Recommendations Section of the report.

5.3. Written Guidance

Written guidelines have been provided to the coops by NRECA through the PDO. These are in English and in Indonesian, and appear to cover virtually every routine aspect of RE coop operation. Each one is comprehensive and clearly written.

5.4. Technical Assistance to the Coops

Through the written guidelines referred to above, and through training programs, NRECA/PDO has provided much technical assistance of high quality to the coops, in the areas of accounting, billing, meter reading, collecting, warehousing and inventory control. Since this is a new type of project for DGC, the PDO itself has not independently provided these sorts of services, but rather has worked cooperatively with NRECA, learning on the job. Not all the procedures developed or taught are adhered to by the coops, however. This is due to weakness in management, and a lack of experience and work discipline among some, perhaps the major part, of coop employees (this varies according to location). There is a need for assistance at the coop level to assure that procedures are followed, to develop work discipline, and to supplement deficiencies (e.g., in accounting procedures at Luwu and Lombok) until the coops have matured institutionally.

5.5. Financial Controls Over Funds Administered by BRI

The Bank Rakyat Indonesia (BRI) is the bank which actually holds GOI project funds prior to local disbursement. Though there have been two or three anomalies involving obtaining small amounts of money from BRI, in general the system works, and there is no basic failure or loophole. In one instance DGC moved swiftly and forcefully to meet the particular situation. A more serious problem exists in the lack of strong accounting capability in Lombok and Luwu, and there is an immediate need for establishing independent auditing by PDO of all three coops' fund disbursement as a continuing function. Indonesian law does not permit the government to hire private auditors, and the government does not possess a corps of experienced, well trained auditors - at least, the DGC does not. The Director is working on this problem.

5.6. Training Programs

Training programs carried out to date are not sufficient to meet the needs of the coops, though their range has been fairly comprehensive and their quality high. NRECA has done a good job in planning and executing training under its contract. The problem is that project delays have rendered original training schedules largely irrelevant. At present there is really no project for the trained personnel to apply their skills to. A customer service department serving a few hundred nearby households is a qualitatively different thing from a department serving 23,000 households in 108 villages; likewise, operation and maintenance

of 100 KW gensets is different from operation and maintenance of 500 KW gensets and associated plant. (Training may have to be contracted by GOI from the supplier of equipment.) The training is thus seen to be out of phase with the evolution of the rest of the project. It is therefore desirable to retain a training capability in Indonesia which can meet the actual project needs as they develop; to forecast this, the dates of arrival of generation equipment have to be known with more certainty than is presently the case. In the team's opinion, retaining training capacity means at least retaining four persons now in Indonesia for NRECA: R. Shoff, S. Adkins, L. Sansing and J. DeFoor. The reasons for this is that these persons have developed an understanding and knowledge of the project which it would not be possible for an outsider to develop rapidly. The Conclusions and Recommendations Section address this need.

5.7. Coop By-laws: Definition of Responsibility

The by-laws, taken together with Indonesian legal provisions, adequately define the purpose, responsibilities and authority of the Board of Directors and the coop manager. There is an issue over the degree of responsibility that Boards have for misfeasance or malfeasance by the managers reporting to them. This is also an issue in the United States at this time; but in Indonesian rural areas the establishment of a well-funded project presents special problems of control.

Law No. 12 of 1967, on which coops in Indonesia are based, places authority and responsibility for the operations of cooperatives in the Board of Directors. Ministerial Decree No. 1008 of 19 November, 1970 provides for the appointment of a coop manager. Decree No. 229 of 24 February 1972 expands on the distinction between the Board of Directors and the manager; requires the appointment of a manager; specifically lists his functions; and describes the relationship which should exist between the Board and manager. This decree appears to the team to offer adequate lines of authority to the coops.

Sources of problems include the following, which are present at one or more sites:

- the absence of a bonding system in Indonesia for employees makes the Board feel vulnerable, and therefore responsible for conducting daily business (note that the by-laws require bonding for some employees - an impossibility);
- Board members, at least at this initial stage, tend to be "persons of consequence" in their areas, and thus take on directive roles easily;
- because the coops offer an employment opportunity where jobs are scarce, some Board members have obtained paying staff positions in coops, thus creating a conflict of interest;
- weak coop managers, presently simply acting managers sent out by PDO, are not able to counterbalance pressure from the Board;
- the concept of a policy making board and policy-executing management is relatively new in Indonesia, and is very new in rural areas.

The PDO Director has taken some steps to rectify a confusing situation. For example, in Luwu he has instructed Directors to choose whether they wish to remain Directors, or become salaried employees (three chose to remain Directors only, three became employees but three months after the directive, have failed to resign as Directors). To sort things out definitively, reliable site monitoring and advice had to be provided; and at present, none of the acting managers of the coops is strong enough to do this.

5.8. Coop Staffing

For their present (i.e. demonstration project) needs, coops appear to be adequately staffed as regards small genset operation and routine maintenance; materials receiving (except Luwu): meter reading, billing and collecting; customer service; power plant recording; warehousing; meter entrance, service drops meter installation (except Lombok); electrifications; linemen. Coops appear inadequately staffed in construction cost accounting (except, perhaps, Lampung); financial reporting (except Lampung); general management and fulfillment of routine clerical functions (except Lampung).

All coops have some employees who do no work when they are on site, or who do not show up for days at a time; this problem is acute in Lombok and Luwu. It is directly linked to the lack of control over salary levels by either the coops or the DCG, and to the fact that it is impossible to fire a government employee in Indonesia.

5.8.1. Training and Manpower Development Plans

NRECA has provided systems and training materials of good quality in many areas to the coops. But serious questions exist as to what future training needs will be, once the equipment arrives for interim and final power generation. It is certain that more training materials will have to be developed, in the opinion of the team.

At present the coop managers are struggling to obtain the qualified personnel they need (especially Lombok and Luwu). It is simply too early to speak of manpower planning, where qualified and trainable people are extremely scarce, and the salary system does not permit reward for merit, manpower planning is a concept which does not hold much relevance.

5.8.2. Salaries and Benefits

In general, salaries and benefits are not adequate to attract and keep qualified personnel. But as with many other statements about Indonesia, this one has to be qualified.

1. Managers. They now make about Rp.200,000 per month (\$300) from all sources. All sources means a combination of the following: income to the coops from collections, Indonesian project funding, supplementary funding approved by BAPPENAS, and regular PDO salaries (where the manager came from the original PDO staff). A house and vehicle (jeep) are also provided, and per diem is paid for trips to Jakarta or outside the project area. This package is sufficient to keep managers on the job.

On the other hand, similar positions on the open market pay about three times this amount (but usually without housing).

2. Accountants. Accountants get about Rp.150,000 (\$230) per month, with no house or car; the coop provides a motorcycle. In Lampung (a few hours drive from Jakarta plus ferry ride), the accountants are good. In Lombok (an impoverished island to the East of Java and Bali), the manager is trying to find a replacement for the present accountant, who has threatened to quit; no trainable replacement can be found, reportedly. (Confirmed by a source of PDU). In Lulu there is no accounting capability other than the manager, who cannot attempt to perform his managerial tasks and at the same time keep the accounts. An effort is being made to recruit a candidate from the provincial capital, but Luwu is so isolated (12 hours by jeep) from the capital, the only real source of trainable candidates, that this is considered quite unlikely, at the stated salary, which cannot be exceeded.
3. Technical staff. Technical staff (mechanics, operators, etc.) make between Rp.50-60,000 (\$76-92) per month, without housing. Motorcycles are provided. The ability of the coops to retain qualified persons at these rates is very doubtful.

The government salary system, as is the case in many developing countries, is geared to rewarding academic degree holders, and timeservers. Ability and dedication are not taken into consideration in salary structure of the RE project; thus there is no monetary incentive to do well. In Lampung, for example, there are 10 employees in the Technical Department, each of whom receives Rp.50,000 per month regardless of whether he sleeps on the job, or works hard and well. The Lampung DGC coordinator has tried to obtain some leeway to adjust salaries within certain ranges, but the PDU Director reports that this is not possible (and the decision would have to involve a nationwide change of policy).

5.9. Role of NRECA in Institutional Growth of Coops.

A. Communication with Coop Personnel. The NRECA could have had a much greater impact on coop management, and could have been much better informed, were it not for the total lack of even rudimentary Indonesian language capability. The team found that in every case, advisers relied on a "favorite employee"; these persons, while certainly intelligent, were selected because of their knowledge (in one case very slight) of English. NRECA personnel have basically been isolated from the real world of their sites because of this reliance, which has also caused jealousy in some cases. Advisers necessarily see events through the eyes of their interpreters, whose judgment, the team observed, as sought in one site about matters clearly beyond the competence or responsibilities of the individual involved. In another site, the NRECA adviser wished to see "his man" promoted to manager of the coop. To many of the team's questions site advisers had to reply "I don't know," or "They never told me about that." Lack of an ability to communicate also resulted in isolation in personal life, lack of friendly contacts among Indonesians, etc. This is especially disappointing to see, given the dedication which obviously animated most of the people we spoke with in the field, and in Jakarta.

B. Leadership Attitudes. All NRECA site advisers limited themselves strictly to advising and cajoling - in other words, to the letter of their responsibilities as spelled out in writing from NRECA Jakarta. But in the Indonesian development context it is very customary for foreign advisers to take a strong role in setting things to rights, where they obviously are going wrong. That kind of total involvement is lacking. Problems were relayed in most cases to NRECA Jakarta, via letter or in "team meetings." In the opinion of the team, NRECA management in Jakarta could and should have made much stronger representations to PDU management, and could have encouraged field personnel to solve problems, rather than merely reporting them. Field advisers constantly told the team that "we don't have the power to do things". De facto power could have been created, the team feels, if field advisers had been strongly supported by NRECA Jakarta management, and if necessary by USAID.

Finally, neither AID personnel nor NRECA Jakarta management have spent enough time in the field, particularly at the "hard to reach" sites. Luwu has never had a meaningful visit from NRECA management, the sole visit being a ceremonial occasion lasting less than a day. On that occasion the site adviser had no opportunity to discuss problems at the location of the problems - e.g., the lack of diesel fuel storage, which GOI is obligated to provide according to commitments made at the time of grant supplemental funding (March 1981). Up to the time of the field visits, no AID project personnel had visited even for two years.

5.10. Role of AID Jakarta

It is evident from interviews with AID Jakarta engineering personnel and perusal of internal evaluations that at the engineering and project monitoring level, AID was well aware of serious problems in communication between the two US contractors, improper qualifications of individuals, and DGC complaints of *mismanagement, improper tasking of personnel, inadequate time on the job, slow performance in completing cost estimates, poor reporting, and others. AID project level personnel strongly recommended corrective actions. It took however, about two years for needed changes in contractor personnel to occur, and during this time, some AID funds were expended for extremely doubtful returns so far as the engineering contractor was concerned.

5.11. Nature of the RE Project

Since its inception, despite obeisance paid to development in the original project paper and amendment (3/81) the RE I (outer islands) project has essentially been viewed as an engineering rather than a development project. If the benefits hoped for are to materialize, and particularly if rural poor are to be served, the project has to be strengthened in its developmental aspects. Practically speaking, this means a major effort to link the provision of electric power to other ingredients of development capital, nearby resources, other government programs (such as small industry creation), market needs which could be served by such industries, etc. A good deal is happening along these lines in Indonesia, but so far this project has not appeared to be aware of it. With interim power probably available at all sites by mid-1983, a "productive uses" program should be organized so that power can serve development. Otherwise, the team feels, the project may be completed in an engineering sense while never testing its development potential.

The team has recommended technical assistance in the form of a productive uses specialist to get things moving. But it is also important, we feel, for AID itself to monitor this process closely. For that reason, we also have recommended that AID Jakarta assign an Indonesian-speaking development officer to this project. He or she would work in conjunction with the person monitoring the engineering work, but the responsibilities would be separate. It is felt that this might be accomplished through a commitment of 1/3 of an AID person's time in any single year.

VI. FINANCIAL VIABILITY OF COOPS

6.1 Financial Viability

None of the rural electrification cooperatives will be more than marginally financially viable even with a major successful productive uses program. This conclusion is based on: (1) detailed financial analysis of the cooperative with the most favorable conditions; (2) review of the USAID Project Paper (AID-DLC/P-2244); (3) assessment of the finances of the demonstration project and (4) interviews with key project personnel.

6.1.1. Financial Analysis

Financial analysis of Lampung, the cooperative with the best financial returns in the original project paper, used the same basic assumptions as in the original feasibility study performed by NRECA (Tables A1 and A2 in the Appendix). However, the cost of the generators and fuel (diesel) and the tariff rates were updated to reflect current values. We used the present estimate of generation cost of \$1,058/kw and the present market price of \$13.1/ liter as the cost of diesel.*

It is clear (Table 1) that the originally conceived rural electrification project will not be financially viable. Even with tariff rates increased to the PLN values and cost of the generation plant reduced by 1/3, the net operating margin in Lampung will not be positive in the first 15 years. To achieve positive operating margins by the tenth year, the variable tariff rate will have to be increased by more than 100%, making electricity unaffordable to the rural poor. Any increase in the price of diesel due to the removal of subsidies will adversely affect the already difficult financial situation.

Analysis was also carried out of Rural Electrification I, where 7 MW of power (3 x 2.1 MW units + 2 x 500 KW units in each site) is installed in Lampung with the assumption that 50% of the households in the origin can afford and are connected to the scheme. All the assumptions for this analysis, presented as footnotes to Table 2, were very optimistic. However we find that, with the updated cost figures and presently prevailing tariff rates, the Lampung cooperative will not have positive net operating margins during the project life. The RE I project could become financially viable if the tariff rates are increased by 50% and twice as many productive use customers are connected to the scheme.

It should be made clear that the last finding depends on very optimistic assumptions regarding the achievement of residential customer connections and load

* This figure is based on the assumption that 9, 21MW units will be purchased at the CIDA grant of \$25 million canadian dollars (U.S. \$20m). CIDA personnel at Jakarta indicated that no more than 6 generators could be guaranteed at the \$25 m grant which makes the cost close to US \$1500/kw. These figures should be contrasted with the f.o.b. figure quoted to the team by Detroit Diesel Allison Company of Long Island, New York (aGM generator suppliers) of US \$275/kw. This figure is typical of 2 mw units and also tallies with figures quoted by other firms. It seems that the canadian generator costs would be extremely high even if transportation costs are taken into account.

TABLE 1

Financial Analysis - Lampung (Total RE Project)*
(in U.S. \$1000s at present cost) US \$1 = Rp.650

Year	At Present Coop Tariff Rates ¹				At PLN Rates + Generation Cost = \$750/KW ²					
	Operating Revenue ¹	Cost of Power ³	Distribution Cost ⁴	Total Operating Cost	Net Operating Margin	Operating Revenue ¹	Cost of Power ³	Distribution Cost ⁴	Total Operating Cost	Net Operating Margin
1	407	678	384	1062	- 655	465	536	384	920	-455
2	872	1237	438	1675	- 803	990	989	438	1427	-437
3	1256	1737	494	2231	- 975	1417	1382	494	1876	-459
4	1585	2065	598	2663	-1078	1793	1656	598	2254	-461
5	1896	2436	632	3068	-1172	2165	1971	632	2603	-438
6	2192	2799	653	3452	-1260	2520	2280	653	2933	-413
7	2476	3157	752	3908	-1432	2864	2582	752	3334	-470
8	2822	3380	776	4156	-1334	3288	2805	776	3581	-293
9	3087	3554	841	4395	-1308	3618	2979	841	3820	-202
10	3372	3888	940	4828	-1456	3963	3262	940	4202	-239
11	3700	4276	969	5245	-1545	4371	3599	969	4568	-197
12	3961	4440	978	5418	-1457	4703	3762	978	4740	- 37
13	4273	4847	1058	5905	-1632	5085	4115	1058	5173	- 88
14	4555	5205	1075	6280	-1725	5435	4418	1075	5493	- 58
15	4764	5344	1082	6426	-1662	5693	4557	1082	5639	- 54

Notes:

* Basic assumptions, which were used in the USAID Project Paper are taken from NRECA, Rural Electrification: Preliminary Engineering and Feasibility Study Report, Central Lampung dated August 1977.

Projections of consumer connections and power production are reproduced in Tables A1 and A2 in the Appendix.

1. The present monthly Lampung tariff is Rp.1600 (service charge) + Rp.33.5/KWH.
2. The PLN rate is Rp.1600 (service charge) + Rp.45.5./KWH. The generation cost used in this calculation is very optimistic given the CIDA estimates (see test). However US/AID, Jakarta engineers were of the view that the generation cost was closer to \$750/KW in Indonesia. The analysis was performed to show the contrast between the two cases.
3. Capital costs are 500 KW unit = Canadian \$1,213 million and the 2.1 MW unit = C\$2.77. Exchange rate C\$1 - US \$0-80. See Table A2 in Appendix.
4. Allowing US/Aid, Jakarta's directions we assume that the cost of the distribution plant does not increase from the NRECA 1977 estimate. It should be noted that this is a very optimistic assumption.

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TABLE 2

Financial Analysis - Lampung (RE - I)*

(in US \$1000 at present cost)

At Assumed Consumer Connections**						2 x Productive Uses		2 x Prod. + 1.5 Tariff	
Year	Operating Revenue	Cost of Power	Distrib. Cost	Total Operating Cost	Net Operating Margin	Operating Revenue	Net Operating Margin	Operating Revenue	Net Operating Margin
1	408	921	192	1113	-705	429	-684	542	-571
2	872	1115	192	1357	-485	920	-437	1153	-204
3	1256	1249	192	1441	-185	1335	-106	1660	-219
4	1256	1249	192	1441	-185	1335	-106	1660	-219
5	1256	1249	192	1441	-185	1335	-106	1660	-219

otes:

* Basic assumptions:

1. 7 MW capacity installed
2. 23,100 connections by 3rd year of which 20,000 are residential consumers
3. Power production increases from 4,99 MWH in Year 1 to 13,630 MWH in year 3 and remains at this level (load factor = 22)
4. Distribution system costs 1/2 that for total project in year i and these are no increments after energization.

** Same assumption as in Project Paper.

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factors by the third year of energization and low cost of distribution of electricity. Further detailed analysis would be required before arriving at firm conclusions. It is clear that neither original rural electrification project nor the limited version, RE I, will be more than marginally financially viable.

6.1.2. USAID Project Paper

The USAID Project Paper, which uses the NRECA feasibility study as the basis, comes to the conclusion that the outer island projects are financially "sound" (pp. 10, line 36) although the bread-even points (dates when net operating margins are positive) in all projects are eight years or more and in one project (Luwu) is eleven years which is beyond even NRECA's criterion. Indeed the Luwu project, even using the out-of-date lower cost figures, does not generate positive equity even in 15 years.

The financial analysis of NRECA which was used in the USAID project paper depends on many conditions and assumptions. As can be expected, the cost of generation including power plant and fuel have increased drastically. The present installed cost of the Canadian generators is US \$1058/KW compared to the assumed figure of \$500/KW, a 200% increase. The cost of diesel is Rp 85/liter (US \$13.08) compared to Rp 25/liter (US \$6.02) in the original project design. The tariffs that are being used in Lampung is the same as the rate assumed in the project paper for consumers above 20 KWH/month.

The cost crucial assumptions is the predicted levels of consumer connections. It is assumed that 50% of the residential and 90% of the commercial consumers of the region would receive electricity 3 years after 5 MW of power is installed (5 years from the Project Assistance Completion Date) and that the productive use of electricity would increase from an initial value of 15% to 20% of the total energy use during the 15 year period of the project. After reviewing pertinent documents and visiting the project sites, the team came to the conclusion that these assumptions were over optimistic. This view is concurred by the original NRECA financial analysis which also found the predicted level of domestic consumer connections "highly ambitious" (Lampung Feasibility Study, pp. 90, line 7). The NRECA study found that if the forecasted consumer level is delayed by 3 years, none of the projects would be financially viable.

No productive use consumers (grain mills, irrigation pumps etc.) were connected to the electrification cooperatives in any of the demonstration projects. This is mainly due to the unavailability of 24 hours electricity service until very recently (less than six months prior to today) in all the sites. However, given the availability of gravity irrigation in two of the three project areas and the diseconomics of switching to grain milling using electrical equipment, it is unlikely that these would be major consumption of electricity by the customers that the USAID project paper expects. This point is further elaborated upon in section VIII - "Productive Uses." Productive load can be increased by integrating the RE cooperatives with government rural industrial development programs that exist in all three project sites.

The assumptions regarding future level of commercial connections seem to be optimistic also. While many of the commercial establishments in the present distribution area of the Lombok demonstration project were receiving electricity

from the RE project, there were no commercial connections in Lampung. However, without a more extensive survey, it is difficult at present to estimate the percentage of commercial consumers in the sites that receiving electricity.

Finally it should be noted that many of these rather critical assumptions of the USAID project paper were based on a socio-economic survey that are carried out by the Department of Social Economics of Institut Pertanian Bogor (Bogor Agricultural University), with the participation of USAID, Jakarta. The survey has various methodological problems. It is difficult to assess the exact methodology from the survey report: Socio-Economic Study of The Rural Electrification Project in Indonesia dated September 1977. A few points will illustrate our concerns. For instance, it is apparent that the number of households that are able to pay a certain tariff for electricity was based on direct questions of household heads as to whether they were willing to pay that tariff or not. This is hardly a scientific method of estimating the potential levels of household connections. Willingness to pay based on household expenditure on kerosene is estimated using faulty statistics. First average household kerosene expenditure is estimated for each of 10 desas (villages). Then the average for the site is based on adding up the desa averages and dividing by the number of desas. The correct estimate of average household expenditure on kerosene would be weighted average where the desa averages would be weighted by the number of households in each desa.

The financial feasibility analysis of the USAID project paper assumes that the tariffs to be set after energization would be the lowest value that was suggested to the households during the survey, i.e. the tariffs with the apparent greatest household connection. In the case of irrigation potential that appears in the section labelled "Surplus Benefits: Increased Economic Activity" of Productive and Agricultural Consumers "Project Paper, annex K, pp. 18-20), the USAID project paper assumes that the potential hectares of land that could come under pump irrigation in Lampung and Lombok to be total area minus cultivated land estimated by the IPB survey. In Luwu, it is unclear how this estimate is arrived at although it is close to total area less cultivated land. In other words, uncultivated land is considered to be potential land for pump irrigation, a gross overestimate at best. A closer look at the analysis in the project paper and companion reports is likely to reveal other such faulty procedures.

6.1.3. Finances of Demonstration Project

The generator sets for the demonstration projects in each site were given as grants by USAID. Even without having to account for the amortized cost of the power plants and the associated depreciation and interest, all three demonstration projects are running at a loss (Table 3) when interest payments and depreciation of equipment are taken into account. However, the coop at Lampung has net positive cash flow which should increase with the restructuring of tariffs. Neither an increase in the tariff structure to the PLN rate nor an increase in customers that can be sustained by the presently available capacity will result in positive operating margins in Lombok. An increase in customer service and tariff rates could provide some relief in the other areas.

These are no built in mechanisms to create incentives for a more efficient financial operation of the coops because salaries (a major portion of operating

TABLE 3

Financial Statistics of RE Cooperatives*
(Per Month in Rp 000s)

	Lampung	Lombok	Luwu
Revenue	3454	3233	185
Costs			
Production Expenses: Fuel	1410	1808	87
Operations ¹	410	335	77
Maintenance ¹	12	295**	21
Distribution: OSM ¹	131	210	19
Other ²	735	1287	109
Total Operating Costs	2698	3935	313
Financial Viability			
<u>Present Coop Tariffs</u>			
Gross Operating Margin	756	- 702	-128
Cash Operating Margin ³	399	-1791	-203
Net Operating Margin ⁴	-367	-2921	-203 ⁵
<u>PLN Tariff</u>			
Gross Operating Margin	1209	- 3	134
Cash Operating Margin ³	852	-1092	59
Net Operating Margin ⁴	86	-2222	59

Notes:

- * Dates Lampung: May 1982; Lombok: February, Luwu August 1981
- ** The average maintenance cost (most spare parts) in 1982 on Lombok was 1401 thousand which is much high than usual. We take the maintenance cost in January 1982 to be the representative figure.
- 1. Average for the year
- 2. Includes administrative and sales costs and costs of collecting on bills
- 3. Net of interest payment
- 4. Net of depreciation and interest payments
- 5. No depreciation/amortization included in Luwu financial statistics for 1981.

expenses) are paid for by GOI. The demonstration projects seem to be an apparent indication that the GOI will have to continue to subsidize the RE cooperatives for the life of the project. However before a final conclusion is drawn about the financial operation, the cooperatives would have to be operating as larger entities that provide service to a greater number of customers.

6.1.4. Impact of Petroleum Price Increases. It is clear from analyzing the finances of the cooperatives and the financial feasibility of the project that any increase in fuel costs would adversely affect an already difficult financial situation. Fuel costs range from 35% to 52% of the present total operating costs (not including interest and depreciation). If the diesel subsidies are removed, the coops will almost certainly have to increase their tariffs beyond the PLN rates or order to keep some financial control. However rate increases would lead to less consumption by the poorest households and would make the 50% residential consumer connections even more difficult to obtain. As noted above, the level of consumer connections is crucial to the possible viability of the project. GOI would have to continue to provide subsidized diesel to all three outer island rural electrification cooperatives.

6.2. Financial Reporting

All three cooperatives have effective procedures for meter reading, billing and collecting revenues from their customers. In all three coops, these procedures are being followed quite meticulously. In Lampung there is a discrepancy between generated and kilo-watt-hours billed. The estimated generated power is always less than that billed when this should be the other way around. The main reason for this is that the power generated is estimated on the first day of three days of meter reading. This problem is going to be rectified by next month.

Accounting in the coops follows the Uniform System of Accounts that were set up by NRECA following the methodology used in the rural electrification cooperatives in the United States. It is apparent that the accounting system incorporates sound financial control procedures if they are followed. NRECA has also set up guidelines for accounting and control in each cooperative and has given a number of training seminars on accounting procedures for all the relevant staff of all three cooperatives.

Financial reporting procedures are being followed in the cooperatives with varying degrees of care and competency. With the exception of Lampung, there are no good accountants in the cooperatives. The Lampung cooperative submits financial and operating reports to PDO-RE and NRECA on time. Both Lombok and Luwu are behind schedule with completed reports being available only until February. The financial report prepared by the coops seem adequate for the purpose intended and they have been used in other countries. It is unclear at present whether PDO monitors them to ensure corrective action if necessary. From interview with various project personnel it is apparent that PDO does not have fully qualified accountants in its staff to carry out this activity.

Financial control procedures are not being followed very effectively in any of the cooperatives. There were various incidents of little or no attention paid to the accounting guidelines. For example, in the Lombok cooperative we found that the billing clerk apparently filled his books by going to the store and checking

its records. The reason for this was, apparently, that the store clerk did not send the correct billing slips to the billing clerk. Such practices makes the financial control inadequate at best. It is clear that the manager of the cooperatives should be made responsible for seeing that his staff follows the correct procedures or, if his understanding of the procedures is inadequate, the consultant, in this case NRECA person on site, should be given the authority to do so. Occasional external audits of all three cooperatives will be invaluable to ensuring that the cooperatives follow the financial control procedures.

VII. AFFORDABILITY/DISTRIBUTION

7.1. Affordability by Poorest Households

The limited household survey and interviews revealed that none of the electrified households in the demonstration project used electricity for cooking. Households would substitute electricity for kerosene for lighting purposes only. The survey also lead to the conclusion that the poorest households used around 1/2 liter of kerosene per day (15 liters/month) or less for lighting. This figure might well be an overestimate. The environmental assessment study by Paul Weatherly came to the conclusion that the bottom 40% in Luwu and Lombok buys 70 liter per year per household (pp. 46, line 4) which works out to be approximately 1/5 liter per day. Our analysis shows that inspite of our relatively optimistic estimates, the poorest households would not be able to afford electricity.

At the present price of kerosene and tariff structure, electricity would not be affordable to the poorest households in Lampung on purely economic grounds. This is mainly due to the high base charge (fixed cost) in that site. In Lombok and Luwu, the affordability of electricity depends on how the housewiring cost are distributed (Table 4). If either the housewiring costs are paid for from savings and not included in the marginal economic analysis by the households or these costs are distributed over the depreciation life of the housewiring equipment, the households that use more than 1/2 liter per day of kerosene for lighting will be economically better off by using electricity. However, if the housewiring costs are distributed over the first 12 months, which is the maturity period for housewiring loans, the poorest households would not be able to afford electricity in any of the sites.

In Luwu, the main determinant of affordability is the price of the alternative fuel, kerosene, which is between Rp.100 and Rp.125 per liter, 33% to 66% higher than in the other areas. Field survey and site interviews by the team revealed that almost all of the households, including the poorest, in the present distribution area had switched to electricity for lighting. In other areas some of the poorest were receiving electricity due to extra economical benefits such as ease of use, cleanliness etc. The poorest households that get electricity often use just 25 watts of power, i.e., a single bulb of 25 W for about 4 hours at night.

7.2. Level of Affordability of Electricity

Further analysis (Table 5) shows that in Lampung, with the present tariff structure, only households that consume more than 0.8 liters/day (23 liters/month) for lighting would be able to afford electricity. If the housewiring costs are distributed over the loan period of 12 months, the minimum kerosene consumption requirement increases to 1.1 liter/day (32 liters/month) in Lampung and between 0.6 and 0.7 liter/day in Lombok and Luwu. This the minimum monthly lighting bill in these areas have to be between Rp.1600 (Lombok) and Rp.2300 (Lampung) before the households can afford to become electricity consumers. There are no data at present on either income levels of the households in the three areas income levels of the households in the three areas (learned from interviews with head of the Control Statistical Office, Biro Pusat Statistik) or the percentage of income

TABLE 4

Affordability by Poorest Households

Assumption: Poorest Households use 1/2 liter of kerosene/night for lighting.

	<u>Lampung</u>	<u>Lombok</u>	<u>Luwu</u>
<u>Kerosene for Lighting</u>			
Kerosene Price (Rp/liter)	70	75	100-125
Minimum Use (Liter/month)	15	15	15
Lighting Bill	1050	1125	1500-1875
<u>Electricity for Lighting</u>			
<u>Present Fixed Cost/Month</u>	1600	975	1100
Tariff (Rp/KWH)	335	30	45
No housewiring Cost ¹	0	0	0
Electricity (KWH)	none	5	8.9-17.2
Power (Watts) (6 hour service)*	none	28	49-96
Power (Watts) (4 hour service)*	none	42	74-143
<hr/>			
Housewiring Cost	692	583	833
(over 12 month) ²			
Total Cost (before electric)	2292	1558	1933
Electricity (KWH)	none	none	none
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TABLE 4 Continued

	<u>Lampung</u>	<u>Lombok</u>	<u>Luwu</u>
Housewiring Cost	116	98	140
(over depreciation) ³			
Total Cost (before electric)	1716	1073	1240
Electricity (KWH)	none	1.7	5.8-14.1
Power (Watts) (6 hour service)*	none	(9W)	32-78
Power (Watts) (4 hour service)*	none	14	48-118

* Rounded to nearest digit

1. Assume that housewiring is paid for by savings and that the householder only looks at monthly cost.
2. In all sites, the loan agreement requires a 25% down-payment and no interest. The Luwu coop. charges interest of 6%. For this calculation, we have assumed that these are equal monthly payments over a year and no interest.
3. We have assumed that the depreciation life of the housewiring equipment is 10 years and that the opportunity cost of housewiring investment (discount rate) is 1% a month, which is the Bank Rakyat's lending rate. Money lending in each of these sites can earn interest of up to 5% a month.

TABLE 5

Level of Affordability by Electricity

Assumption: Those whose kerosene use in above monthly fixed cost can afford electricity.

	<u>Lampung</u>	<u>Lombok</u>	<u>Luwu</u>
<u>Electricity for Lighting</u>			
Fixed Cost/Month	1600	975	1100
Housewiring - I			
H.W Cost	0	0	0
Total Cost	1600	975	1100
Min. Kerosene use*	23 (0.8)	13 (0.4)	11** (0.4)
Housewiring - II			
H.W /cost	692	583	833
Total Cost	2292	1558	1933
Min. Kerosene use*	32 (1.1)	21 (0.7)	19** (0.6)
Housewiring - III			
H.W /cost	116	98	140
Total Cost	1716	1073	1240
Min. Kerosene use*	25 (0.8)	14 (0.5)	12** (0.4)

* Monthly use (paranthesis indicated nightly use) rounded to nearest digit.

** Assumes the lower price of Rp.100/liter

used or lighting. Drawing conclusions from the limited household interviews carried out by the team (Table A3 in the Appendix) would be misleading and no attempt is made to do so. Thus it would not be possible at this stage to estimate the household income level at which electricity is affordable without budgetary restraints on basic needs. In order to assess whether the project provides affordable electricity to a good percentage of poor households, an extensive income-consumption survey needs to be carried out in all three project areas.

7.3. Tariff Structure and Affordability

The attainment of financial viability by increasing the tariffs and the provision of affordable electricity service to the poorest households are in compatible goals. If the present base charge (fixed cost) in Lombok and Luwu are increased to the PLN rate of Rp.1600, households that use less than 1/2 liter/day of kerosene for lighting (i.e. the poorest households in our assessment) will not be able to afford the electricity whatever the variable tariff is. The managers in all cooperatives wanted an increase in the tariff rates. They all seemed to agree with each other that the provision of affordable service to the poorest household should be a secondary question; the financial viability of the cooperatives being their primary aim.

One way to restructure the tariffs, increase the coverage of the poorest households and maintain some financial control, is to keep the base charge low (say Rp.1000) and increase the variable charge (say Rp.60/KWH). Such a proposal has been suggested by NRECA (memo. NRECA 899 dated March 30, 1982) and should be given serious consideration. The restructuring of tariffs could even increase revenues by bringing into the RE cooperative system consumers that could marginally afford the electricity.

In order to compute the number of new customers that would result from tariff restructuring, estimates of cross price electricity of demand between kerosene and electricity (for lighting) are required. Apparently no data are available at present in Indonesia on electricity demand at different price levels. Hence such price elasticities could not be estimated.

VIII. PRODUCTIVE USES

8.1. Present Status

At present there is 24 hours electricity service in only Lampung and Lombok and these cooperatives have had this service for only the past six months. (Since around February 1982). The total non existence of major productive use customers in all three sites is a direct result of the unavailability of day time service. However there is some level of households productive use in Lampung and Lombok.

The managers in all three areas are well aware of the need for major successful productive uses programs. In Lampung and Lombok, a director and the manager respectively have drawn up documents that analyze the potential for small productive uses such as vehicle repair shops, carpentry, hatchery and tailoring. None of this apparent potential has been exploited in Lampung. In Lombok the team visited a few households that had converted to using power tools for workshops, carpentry and tailoring. There was also one poultry farm (100 birds) that had recently starting using electricity for its hatchery. In Lombok the Ministry of Small Industries had given materials and equipment worth Rp.5 million for productive uses in households.

The RE coop in Lombok is able to give credit for households to buy equipment for a productive use program. However the interest rate they charge, 3% per month (36% per annum) is very high. Branches of Bank Rakyat Indonesia exist close to the project areas. A productive use program could obtain loans from BRI at 1.0-1.5% per month (12-18% per annum). Interviews with cooperative personnel and household heads revealed that the bureaucratic procedures for obtaining credit from BRI was too cumbersome and that this discouraged households. There has been no attempt made by the cooperative management incorporate BRI services for a productive uses program, mainly because the electrification project itself has just got started.

8.2. Major Productive Uses

The financial and economic feasibility of the project depends critically on the incorporation of major productive use consumers. None of the three cooperatives have major productive loads at present. Below we assess the potential for identifying and incorporating major productive use consumers.

8.2.1. Irrigation

The original feasibility study assumes that electricity could be used productively in irrigation. Inspection of the project areas, discussions with key project personnel and a review of some other studies reveals that most of these areas are well served by gravity irrigation and that there exists much governmental assistance, though the Department of Public Works, to rehabilitate and maintain these irrigation systems.

Surveys of ground water potential in Lombok by Crippen & Co., contractors to the Canadian International Development Agency shows that groundwater reserves are

present in Lombok and that their exploitation is technically and economically feasible. The economic feasibility is subject to dispute and more further study is required before the cooperative can depend on the possibility of obtaining consumers that use electric pumps for irrigation.

8.2.2. Agro Processing

The original project design assumed that 20% of the total electricity use by the 5th year would be in grain mills. With a well directed and aggressive program this potential could be tapped. There were many grain mills in the project areas - 500 mills in the Lampung area according to the estimate of the NRECA consultant. The grain mills that use electric motors generate their own electricity by using small diesel generator sets. Many of the mills use gasoline engines. It would be economical for the grain mills to take advantage of the economics of scale present in electricity generated by the rural electrification cooperatives. The price of electricity from the cooperatives should be cheaper than the cost of their own generated electricity. However they would require guaranteed 24 hours service and preferential treatment during brown-outs. The grain mills that use direct driven gasoline engines could find it expensive to convert their existing systems into electric. Moreover, subsidized diesel and gasoline prices make these fuels more economical than electricity.

Other agro-processing industries, such as flour mills, palm oil extractors etc. can be incorporated into the rural electrification project, especially if these are going to be new units. The increase in agro-processing units that become customers for coop electricity would depend, besides the guaranteed 24 hour service, on two factors. First, agricultural potential in those areas need to increase, Secondly, the cooperative management has to promote the use of electricity by aggressively pursuing these linkages and by extending promotional tariff rates.

The promotion of agro-processing activities would be outside the scope of the cooperatives. Such potential should be made aware to the relevant GOI department through the PDO. It is important to have a USAID consultant who has experience in Productive Use programs to analyze the potential and to design methods of promoting them. Besides the importance to the financial viability of the RE project, new agro industries based in the rural areas have important implications for employment generation and for reducing migration.

8.3. Local Development Projects

These are various GOI local development programs in all three areas. In Lombok, for instance, a Projects Development Program (PDP) office exists that is promoting various development schemes with the advice of a consulting firm, Resources Management International. At present the PDO in Lombok has been mostly involved in setting up a credit program for household cooperatives in textiles (weaving), basket weaving using bamboo, rattan etc., coconut oil manufactures, carpenters, fish ponds and animal husbandries. They plan to set up new programs in cowhide tanning, manufacturing chicken feed and charcoal (from coconut husks), metal works and car repair shops, and processing sugar cane. The Lombok PDP is involved in 80 villages in central and south Lombok and western Sumatra and not in the RE project area. However discussions with PDP consultants revealed that they were planning to work closer to the RE cooperative, especially in Aikmel.

Thus there is potential to integrate the rural electrification cooperatives with other local development projects but this has to be pursued aggressively by the coop management. At present no such program exists mainly because the demonstration projects are yet to have electric capacity that can sustain large rural industrial consumers.

8.4. Social and Community Uses

At present the only community use of electricity is in the form of street lighting. Street lights are, as yet, not being paid for by the householders. The management in all the cooperatives have had discussions on how to recover this loss, most of it involving the equal sharing of street lighting expenses by the households that have electricity. However no billing methods has been finalized.

IX. COST OF ELECTRICITY GENERATION

The rural electrification cooperatives generate electricity at a high cost. This is shown clearly in Section VI that deals with financial viability. The coops are unable to take advantage of economics of scale that are necessary to obtain cheaper electricity because of the income levels in the project sites. The installed cost of generation is \$1587/KW which is higher than the cost of a comparative unit in the United States. Furthermore, with the possible removal of diesel subsidies, the fuel cost is going to increase as well.

The most important alternative source of electricity in the cooperative sites is Perusahaan Umum Listrik Negara (PLN), the National Electric Power Agency. Electric power from PLN is available at Lampung and Lombok and possibilities exist for the coops to buy cheaper batch power from the power agency. At present, the PLN rates in both areas is higher than the coop rates. However PLN is big enough to take advantage of economics of scale and keep their cost per kilowatt generated lower than the coops. Due to the financial problems the coops are likely to face if they maintain their present tariff rates, it could be cheaper for the coop customers and GOI if some arrangement is made between PLN and the coops to share power. However the cost of PLN generated electricity would also increase with any reduction subsidies for diesel.

Interviews with engineers and others familiar with the areas revealed that there was little potential for using wood or biomass to produce electricity in Lampung or Lombok. PLN had a small hydro generator in Lombok of 100 KW which was not operational when the team visited the station. However the consensus is that no small hydro potential exists in Lombok. In Luwu, the Canadian nickel mining company INCO had a hydro power station which had an excess capacity of around 8-

10 Megawatts. However according to the engineers at C.T. Main Inc., feasibility studies apparently showed that the hydro-electric generator was too far from the rural electric cooperatives to be an economic addition to the coop electricity. According to the NRECA site person at Lampung, PLN had plans to install both hydro-power stations and coal powered mine month generators in that area.

The team believes that a study specifically directed at assessing alternative energy sources in the RE project area is required before making any judgements about the potential for electricity based on non-diesel fuels.

PERSONS INTERVIEWED

PDO

- Sjoufjan Awal, Director
- Djapar Pringgohandoko, Special Assistant
- Ketut Swastika, Head, Material Section
- Col. Sugiyartono, Deputy Chief, and Head, Monitoring, Evaluation & Auditing

NRECA

- Peter McNeill, Manager
- Louis Sansing, Training
- Ray Shoff, Finance and Administration

C.T. MAIN (Jakarta)

- D.A. Dowling, Manager
- Gene Leffler, Project Lead Engineer
- Phil Wilson, Material Procurement

USAID Jakarta

- William Fuller, Director
- Robert Davis, Engineering
- James Baird, Project Monitor
- Robert Johnson, Electrical Engineer; former Project Monitor
- Michael Morfit, Contract Employee; former Ford Foundation

Central Statistical Office, GOI

- G.O.M. Mamas, Director, Economic and Social Bureau
- Wiryanto, Chief, Household Statistics

State Electricity Corporation (PLN)

- Ir. Ketut Kontra, Director of Planning

CIDA (Canadian Embassy)

- David Spring, Counsellor (Development)
- Simmon Williams, Project Officer

Lampung

- Claud Frank, NRECA Adviser
- Ibrahim Sanusi, Coop Manager
- Tony, Member Services Manager
- Frank Cachin, C.T. Main Site Consultant

Lombok

- Paul Swanson, NRECA Adviser
- M. Ridwan, Coop Manager
- Usman Sidik, DGC RE Coordinator
- Farouk, Coop Productive Uses Manager (new position)
- Lalu Ardajat, Former Coop Employee and Interpreter to Swanson
- Bapak Zen, Vice-President, Board of Directors
- Bapak Hajio Mahfud, Member, Board of Directors
- James Keddie, Consultant, Resources Management International (RMI), Project Development Program (PDP)
- Leroy Hollenbeck, Consultant, RMI/PDP
- , Manager, PLN, West Division of Eastern Indonesia

Luwu

- John DeFoor, NRECA Site Adviser
- Wahluyan, Coop Manager
- Herry Salmun, Head, Operations and Maintenance
- Bapak Mohammed, Board Member and Treasurer
- Ramon Santos, C.T. Main Site Consultant
- Bapak Heru Susanto, Director of Manpower and Transmigration, Central Coordinating Office of Luwu Project, Palopo, So. Sulawesi
- Clifford, Nunn, USAID Consultant to Luwu Project

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TABLE A1

Customer Connections - Lampung RE Cooperative

Year	No. of Customers (000s)					Monthly Sales (MWH)				
	Residential	Commercial	Productive Uses	Other	Total	Residential	Commercial	Productive Uses	Other	Total
1	5-25	0-82	0-03	0-78	6-88	105	108	52	47	312
2	12-75	1-47	0-07	1-05	15-34	255	194	113	77	639
3	20-00	1-69	0-09	1-32	23-10	400	222	176	77	875
4	25-25	1-80	0-12	1-50	28-67	505	238	249	134	1126
5	28-25	1-90	0-15	1-66	31-96	678	296	319	160	1453
6	30-75	1-98	0-16	1-83	34-72	861	356	370	192	1779
7	33-00	2-04	0-18	1-99	37-21	1023	428	426	224	2101
8	35-00	2-10	0-20	2-16	39-46	1295	491	486	255	2527
9	36-00	2-16	0-21	2-33	40-70	1476	557	556	287	2876
10	38-25	2-22	0-23	2-49	43-19	1721	536	623	319	3199
11	39-50	2-28	0-24	2-66	44-68	1896	683	696	357	3632
12	40-50	2-33	0-26	2-81	45-90	2066	739	785	394	3984
13	41-50	2-38	0-28	2-99	47-15	2283	812	868	432	4395
14	42-50	2-43	0-29	3-16	48-38	2465	873	910	521	4769
15	43-50	2-47	0-31	3-33	49-61	2567	904	1053	509	5033

Source: NRECA Feasibility Study

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TABLE A2

Cost of Power - Lampung RE Cooperative
(Costs in \$1,000)

Year	M.W.H. Generated 1	Capacity Increment (Composition)MW 2	Cumulative Capacity 3	Cumulative Invest. ¹ 4	Average 5	Investment 6	Depreciate ² 7	D&M ³ Fuel Cost 8	Power Cost 6 + 7 + 8
1	4,999	2 x 0.5 + 2 x 2.1	5.2	8610	8610	431	301	190	922
2	10,093	3 x 0.5 + 3 x 2.1	13.0	21510	15060	753	527	384	1664
3	13,630	-	13.0	21510	21510	1076	753	518	2347
4	17,323	2 x 2.1	17.2	28170	24840	1242	896	658	2769
5	22,067	-	17.2	28170	28170	1409	986	839	3234
6	26,687	2 x 2.1	21.4	34830	31500	1575	1103	1014	3692
7	31,120	-	21.4	34830	34830	1742	1219	1183	4144
8	36,980	-	21.4	34830	34830	1742	1219	1406	4367
9	41,560	-	21.4	34830	34830	1742	1219	1580	4541
10	45,700	3 x 0.5 + 2.1	25.0	41070	37950	1898	1328	1737	4963
11	51,268	-	25.0	41070	41070	2054	1437	1949	5440
12	55,589	-	25.0	41070	41070	2054	1437	2113	5604
13	61,324	2 x 2.1	29.2	47730	44400	2220	1554	2331	6105
14	65,784	-	29.2	47730	47730	2387	1671	2500	6558
15	69,416	-	29.2	47730	47730	2387	1671	2639	6697

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TABLE A2 Continued

Source: All assumptions from NRECA Feasibility Study.

Notes:

1. Assume 500 KW unit @ U.S. \$0-97 million and 2.1 Mw unit @ US \$3.33 million (CIDA estimate).
In Table 1 and 2 in the text, we have revised the CIDA estimate and assumed that 9, 2.1MW units will be installed for the cost of US \$20 million making up each unit US \$2.22 million which is 2/3 the estimate in Table A2 order to reflect this in the cost of power presented in Tables 1 and 2 we have multiplied the depreciation and O&M costs in Table A2 by 2/3. It should be noted that this marginally underestimates the cost of power because we implicitly assumes that the 500 KW units also cost 2/3 of the CIDA estimate.
2. 5% of average total investment
3. 3.5% of average total investment
4. Assume 3.44 KWH generated/liter of diesel at Rp.85/liter = US \$1.00 = Rp.650
5. Does not include interest expense

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TABLE A3 Continued

	Lampung	Lombok	Luwu
<u>No. Electricity</u>			
Household Size :			
Range	n.a	2-7	n.a.
Average)	4.25)
Land Ownership :			
Range (hectare)	0-0.50	0-0.55	n.a.
Average	0.20	0.20)
Monthly Household Income (Rp 000)			
Range	8;40;	6;45	n.a.
Average	20;5	22;)
Kerosene Used for lighting* (litres/m)			
Range	10-24	7.5-40	-
Average	16	16.6	10
Cooking Fuel (no of h.h.)			
Mostly Firewood	5	4	1
Firewood and kerosene	-	-	-
Mostly kerosene	-	-	-

PLN Electricity

Household Size :			
Range	}	3-6	}
Average		5	
Land Ownership :			
Range (hectare)	}	0.12-16	}
Average		0-91	
Monthly Household Income (Rp. 000)	}		}
Range		32;184;	
Average	105;5		
Kerosene use for lighting* (litres/m)			
Range	}	15-25	}
Average		18	

ABLE A3 Continued

	Lampung	Lombok	Luwu
Cooking Fuel (no. of h.h.)			
Mostly firewood		-	
Firewood and kerosene		2	
Mostly kerosene		1	

Note: All figures are rounded off.

- n.a. - not available
- * - Before electricity

WAShaffer:jm:08/03/82

C.T. Main
C.T.S

CLASSIFICATION
PROJECT EVALUATION SUMMARY (PES) - PART I

Report Symbol U-147

1. PROJECT TITLE Rural Electrification - I			2. PROJECT NUMBER 497-0267 Loan 497-T-052	3. MISSION/AID/W OFFICE Indonesia
4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) FY 82-2.			<input checked="" type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION	
5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING	
A. First PRO-AG or Equivalent FY 78	B. Final Obligation Expected FY 82	C. Final Input Delivery FY 84	A. Total \$96.8 MIL	7. PERIOD COVERED BY EVALUATION From (month/yr.) 6/1980 To (month/yr.) 7/1981
			B. U.S. \$41.0 mil.	Date of Evaluation Review

B. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	E. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
C.T. Main to present detailed projects schedules for both PLN and DGC portions of the project.	D. Dowling of C.T. Main	August 14, 1981

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- | | | |
|--|--|--|
| <input type="checkbox"/> Project Paper | <input type="checkbox"/> Implementation Plan e.g., CPI Network | <input type="checkbox"/> Other (Specify) |
| <input type="checkbox"/> Financial Plan | <input type="checkbox"/> PIO/T | _____ |
| <input type="checkbox"/> Logical Framework | <input type="checkbox"/> PIO/C | <input type="checkbox"/> Other (Specify) |
| <input type="checkbox"/> Project Agreement | <input type="checkbox"/> PIO/P | _____ |

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. Continue Project Without Change
- B. Change Project Design and/or Change Implementation Plan
- C. Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER BANKING PARTICIPANTS AS APPROPRIATE (Name and Title)

Robert C. Johnson, Project Officer *R.C. Johnson*
 Robert E. Davis, PTE *R.E. Davis*
 Raymond Cohen, PRO *R.C.*
 Patrick A. Gage, Evaluation Officer *P. Gage*

12. Mission/AID/W Office Director Approval

Signature: *Robert J. Simpson*
 Typed Name: **Robert J. Simpson**
 Deputy Acting Director
 Date: **3/31/81**

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RURAL ELECTRIFICATION PROJECT - PES

13. SUMMARY - The present project status, considering the amount of time and money expended, is very disappointing. The visible results in physical installation and receipt of project materials after expending much money and many man months is minimal. However, it is expected that the project will move faster in the future than in the past as changes have been made which should enhance progress. Cooperatives have been formed, land purchased for ten headquarters sites, fourteen IFB's issued of twenty one to be issued and six IFB's evaluated, fifty four contracts were recommended of which thirty one have been signed and fifteen L/Comms or DRAs have been requested of which thirteen have been issued, all as of July 15, 1981.

It is extremely difficult to determine progress as originally scheduled. One Condition Precedent of the Loan Agreement was that both PLN and DGC furnish to AID "(b) an implementation plan approved by AID which will include: (1) a time phased schedule of proposed Project actions". PLN and DGC submitted such plans, which were approved by USAID, but the PLN did not contain schedules. The earliest PLN schedule appears in the C.T. Main October 1979 PLN report which showed major system construction being completed by the end of October 1982. The latest schedule for PLN in the C.T. Main May 1981 PLN monthly report shows construction being completed at the end of May 1984. From these two schedules, it can be seen that the PLN part of the project is nineteen months behind schedule. The DGC Implementation Plan Schedule shows system construction to be completed in early May 1982. The latest C.T. Main schedule shows the completion to be August 31, 1984. Again, it can be seen that DGC portion of the project is approximately 27 months behind schedule.

The great problem appears to be the amount of time taken for various parties to complete action required of them. Evidently, some parties such as BAPPENAS, SEKNEG, and Bank of Indonesia, had no input to the schedules and have made no commitment to honor such. The schedules are therefore, in a practical sense, meaningless. The complex approval process involving PLN, PDO, BAPPENAS, SEKNEG, USAID and C.T. Main must be closely monitored and each party take action in an expeditious manner if schedules are to be met.

14. EVALUATION METHODOLOGY - This evaluation is the regular annual project evaluation and is based on field trips, project meetings, reports, discussions with GOI and Consultant Project people and personal knowledge of events of the past twenty months.

15. EXTERNAL FACTORS - Influential external factors are listed below:

- (5) \$267,425.00 of the AID Loan for DGC. (May 31, 1981)
- (6) \$201.000 USA interagency transfer of funds for BUCEN services (July 31, 1981).
- (7) \$14,400 of the AID Grant for DGC/PDO baseline data.
- (8) \$52,791.95 of the AID Grant for orientation tour (May 31, 1981).
- (9) \$71,094.41 of the AID Grant for excess property generator sets (May 31, 1981).
- (10) \$57,850.57 of the AID Grant for vehicles for consultant (May 31, 1981).
- (11) \$24,522.52 of the AID Grant for R.E. Administrative Assistant. (May 31, 1981).
- (12) \$18,903.22 of the AID Grant for Training (May 31, 1981)
- (13) Rp385,518,805.50 of the GOI/PLN fund for A&E consulting services (June 30, 1981).
- (14) Rp NA of the GOI/PLN fund for OMT consulting services (June 30, 1981).
- (15) Rp NA of the GOI/PLN fund for Productive Uses supports. (June 30, 1981).
- (16) Rp1,592,008,838.13 of the GOI/PLN for project material and operation (June 30, 1981).
- (17) Rp279,450,000 of the DGC/DIP for A&E consulting services (June 30, 1981).
- (18) Rp111,110,000 of the DGC/DIP for OMT consulting services (June 30, 1981).
- (19) Rp1,214,340,000 of the DGC/DIP FOR PDO & Coop support (June 30, 1981).
- (20) Rp614,220,565 of the GOI Loan for coops. project material and operation (June 30, 1981).

Total US\$ Expended - \$5,859,927.05

Total Rp Expended - Rp 4,196,648,208.50 (Equiv. to
\$6,714,637.13)

Grant Total US\$ Expended - \$12,574,564.18.

(b). Initial Project Funding

The project is a multidonor effort with the Canadian Government (CIDA) financing the generation plants for the three outer island projects and the Royal Netherlands Government (Dutch) financing the conductor for the seven Central Java Systems. The project financing is as follows:

<u>Country</u>	<u>Amount</u>	<u>Date Signed</u>
USAID Grant	US\$ 9 million	March 30, 1978
USAID Loan	US\$30 million	May 6, 1978
CIDA Grant	US\$ 4.95 million	November 16, 1978
CIDA Loan	US\$17.2 million	October 13, 1978
Dutch Loan	US\$ 5 million	March 21, 1979
GOI	US\$30 million	Same as above
Total	US\$96.15 million	

- a. The formation of the PDO and three RE Cooperatives. (June 30, 1981).
- b. Completion of demonstration projects at Klaten in May 1979, Lombok and Lampung with each serving between 1200 to 2000 customers. (June 30, 1981).
- c. Purchase of land for the headquarters complexes for each of the ten sites.
- d. Site development work completed at the five PLN sites (May 31, 1981).
- e. Signing of contracts for 16,000 wood poles and 20,000 steel poles by PLN (May 31, 1981).
- f. Preliminary staking of 3318,4 KM of distribution line by PLN (June 30, 1981).
- g. Preliminary staking of 1622 KM of distribution line by DGC/ PDO (July 3, 1981).
- h. Final staking of 169 KM of distribution line by DGC/PDO (July 3, 1981).
- i. Final staking of 933 KM of distribution line by PLN (June 30, 1981).
- j. Production of final drawings and staking sheets for 169 KM of lines by C.T. Main for coops. (July 10, 1981)
- k. The issuance of IFB's for line materials; tools and equipment; conductor and housewiring and metering materials; and for the seven headquarter sites for PLN. (June 30, 1981).
- l. The evaluation of line materials, tools and equipment, conductor and housewiring and metering IFB's for PLN. (June 30, 1981).
- m. The signing of 18 of 28 recommended contracts by PLN. (June 30, 1981).
- n. The issuance of twelve IFB's for distribution materials, tools and equipment, housewiring and meters, and poles for DGC/PDO/Coops. Separate IFB's were issued for each coop. (June 30, 1981).
- o. The evaluation of six IFB's for DGC/PDO/Coops. (June 30, 1981).
- p. The signing of 13 of 26 recommended contracts by PDO. (June 30, 1981).
- q. The completion of 3646 participant days of formal training for PLN. (June 30, 1981).
- r. The completion of 2643.5 participant days of formal training for DGC/PDO/Coops. (June 30, 1981).
- s. The setting of 972 wood poles. (June 30, 1981) PLN.
- t. The setting of 5196 steel. (June 30, 1981) PLN.

For complete analysis and details of training, see Attachment A.

There are several significant problems relating to the level of outputs but practically all can be traced to the lack of use of the management tools of planning, scheduling and control by, essentially, all parties involved. This has led to a "management

existing rural development programs that together will improve productivity and employment opportunities as well as raise the quality of life for the people who live in the target areas.

There are a very large number and variety of potential productivity uses of electricity in these ten rural areas, most of which could benefit the poor and the very poor. A partial list would include rice and other grain mills, irrigation, poultry farms, sugar processing, copra, tobacco and other food processing, refrigeration in shops and restaurants, sawmills and box factories, rattan furniture and other woodworking shops, hollow blocks, floor and roof tiles and pottery factories blacksmith, machinery and repair shops, food, pharmacy and general merchandise stores. Many of these activities already exist in the target areas using substitute forms of power. However, in other countries, the extension of electricity to the rural areas caused significant increases in the number of new activities. There is reason to believe that this will also occur in Indonesia.

21. UNPLANNED EFFECTS - The unplanned effect to date is, that due to the very slow implementation of the Project and the built-up expectations of the people in the ten project areas, there is a great deal of political pressure to show progress.

22. LESSONS LEARNED - The following lessons should be learned from the R.E. Project by the AID organization:

1. Implementation schedules are not based on a realistic appraisal of the times required for project activities and the inherent delays built into two bureaucracies.

2. Planning, on a realistic basis, is sadly lacking. Grantee or donee support is assumed and agreements are signed but adequate support may be delayed. An example of such was the lack of PDO to provide transport and housing for the consultants during the early portion of the project.

3. Legal documents such as loans, grants and contracts are written in such a manner that there may be a great latitude or difference in interpretation by the parties involved. Much more detail and many more specifics such as detailed implementation plans and schedules, details and required schedules of conditions precedents, detailed scopes of work and support and detailed position descriptions for all staffing must be included to have a project that can be coordinated and administered.

4. A fragmented project is extremely difficult, if not impossible, to effectively implement, coordinate and administer. Fragmentation in one aspect creates difficulties but this project is fragmented in several manners. There are four governments involved - the GOI, USA, Canada and Netherlands; two GOI implementing agencies - the PLN and DGC/PDO/Cooperatives; ten project sites; two administrative project locations - Jakarta and Semarang; and three consulting groups consisting of five elements - A&E for PLN, A&E for DGC, OMT for PLN, OMT for DGC and Productive Uses for PLN.

5. Contracting for consultant services are difficult when long lead times for materials are necessary. Consultant services must be phased in carefully in the early stages of a project to avoid wasted person months. Expeditious staffing of positions which cannot be utilized but may present a facade of project progress must be avoided.

TRAINING

During the first year of the project, Training Plans were prepared by both PLN and PDO with the assistance of the NRECA Training Consultant as part of the overall Implementation Plan. In this Training Implementation Plan it was stated that over the first 4 years of the project, PLN plans to train 758 people in 22 in-country training courses and 71 people in the U.S. and in the Philippines. Likewise, in the same time period the DGC/PDO plans to train 350 people through 30 in-country training courses, and 32 people in the U.S. and in the Philippines.

I. PLN

Following the Training Implementation Plan therefore, to date PLN/NRECA has conducted 10 in-country training courses and trained 225 participants, three (3) overseas training, with 25 participants to the U.S. and the Philippines, and one (1) other overseas training (loan) to the U.S. Bureau of Census with 2 participants.

All of the 225 PLN in-country trainees are still employed in some capacity or other. Some are waiting for the program to develop enough for them to have the job for which they have been trained for.

All of the 27 overseas trainees are still active within the RE project.

II. PDO/DGC

Also in accordance with the Training Implementation Plan, to date PDO/NRECA has conducted 38 in-country training courses and trained 487 participants (215 individuals), and one (1) overseas training in the U.S. with one participant.

Most of the 215 individuals (487 participants trainees) are still employed by PDO/Coops in some capacity or other. However, 11 employees have left the PDO/Coops. The one overseas trainee to the U.S. (Ima Suwandi) is no longer in direct involvement with the R.E.

III. Orientation Visits to the Philippines and the United States

To date the total of estimated 113 Indonesians have been sent for orientation visit to the Philippines Rural Electrification Program, and 8 Indonesian officials to the U.S. This includes

c. The orientation visit to the U.S. are:

3 officials from DGC/PDO, 3 from PLN, and 2 from Dept. of Finance.

1. Of the three (3) DGC/PDO officials sent to the U.S., one person is still with the PDO (S. Awal), one person with no direct involvement with R.E. (Soejoedi, DGC), one person is no longer with the DGC or PDO (Gafar) organization.

2. Of the three PLN officials sent to the U.S.; one person is still with PLN/RE (Rumondor) two other persons have no involvement with the R.E. (Satrya & Muin).

3. The two other officials sent to the U.S. from the Ministry of Finance has no direct involvement with the R.E. project. However, in the implementation of the Rupiah loan funds their office has been in support of the R.E.

d. Evaluation of the A&E Contract

In 1978 two(2) PLN Pusat officials (Rumondor & Satrya) were sent to the U.S. and Canada to evaluate proposals for the RE Architect and Engineering contract and to hold consultations with the Canadian CIDA staff in Ottawa. Of the two PLN officials sent, only one person is still in direct involvement with the R.E.

e. Recently (June 1981), one PLN/LMK and one DGC officials were sent to Bangkok for the Mini-hydro power conference. Both officials has no direct involvement with R.E.

Note: During the early stage of the RE (1977-1978) three groups (PLN/DGC) were sent abroad (to Philippines). Numbers and who, were unknown, records were unavailable.

Others:

Evaluation Training by Bureau of Census

a. Six PLN officials were trained by the Bureau of Census for Evaluation Program in different sessions, and all of these people are still within the RE Project.

b. Six officials of DGC/PDO were trained for the above same training. From the six, one employees has been transferred to Dept. of Trade and Coops (Inspectorate General) and another two were transferred from PDO to DGC. The remainder three are still with PDO Rural Electrification.

7. Course Title: Management Training Course II
Date : September 24-26, 1979
Location : Aikmel, Lombok
Participants: Fourteen persons including members of the coop Board of Directors, audit committee members and key cooperative employees. Total: 14.
8. Course Title: Management Training Course II
Date : October 4-6, 1979
Location : Kotagaja, Lampung
Participants: Twelve persons including members of the cooperative Board of Directors, audit committee members and key cooperative employees. Total: 12.
9. Course Title: Management Training Course II
Date : October 11-13, 1979
Location : Bone-Bone, Luwu
Participants: Eleven persons including members of the cooperative Board of Directors, audit committee members and key cooperative employees. Total: 11.
10. Course Title: Electricians Trainers Training Course
Date : November 5-10, 1979
Location : Aikmel, Lombok
Participants: Twelve participants including three RMSS from Lombok, two from Lampung and two from Luwu cooperative plus five PDO RE engineering department employees. Total: 12.
11. Course Title: Electricians Training Course
Date : November 12-17, 1979
Location : Aikmel, Lombok
Participants: Fourteen local men who will make housewiring installations as contractors for the Lombok cooperative. Total: 14.
12. Course Title: Bookkeepers Training Course
Date : November 5-13, 1979
Location : Jakarta
Participants: Sixteen participants including bookkeepers or future bookkeepers and clerks from the three cooperatives, the treasurer of each cooperatives Board of Directors and PDO RE employees. Total: 16.

19. Course Title: Safety, Safety Procedures and First Aid Training
Date : June 28, 1980
July 30-31, 1980
Location : Aikmel, Lombok
Participants: Fourteen personnel; five linemen, four operators, three RMSS from Lombok cooperative, and two linemen from Lampung cooperative. Total: 14.
20. Course Title: Power Plant Operation and Maintenance
Date : July 21-26, 1980
Location : Aikmel, Lombok
Participants: 8 persons including 6 power plant employees from the Lombok cooperative and 2 employees of PDO RE. Total: 8.
21. Course Title: Electricians Training Course
Date : September 18-24, 1980 (except Sunday 21st)
Location : Lampung Cooperative Headquarters
Participants: Seven RMSS and seven contract electricians. Total: 14.
22. Course Title: Staff Orientation Seminar
Date : September 29 - October 4, 1980
Location : Sinar Rinjani Electric Cooperatives, Aikmel, Lombok
Participants: 10 directors, 3 supervisory/audit, 3 coordinator/manager, 12 key staff from each cooperative project. Total: 28.
23. Course Title: Power Plant Recording
Date : October 1-2, 1980
Location : Sinar Rinjani Electric Cooperative, Aikmel, Lombok
Participants: 5 operators, 3 mechanics. Total: 8.
24. Course Title: Mini - Workshop on Material Handling - PDO
Date : November 13, 1980
Location : PDO conference Room
Participants: Seven (7) PDO employees. Total: 7.
25. Course Title: Accounting Workshop (Refresher)
Date : November 24-29, 1980
Location : KLP "Sinar Rinjani" Aikmel, Lombok
Participants: Accounting personnel; 3 PDO, 2 Lampung, 2 Luwu and 3 Lombok. Total: 10.

34. Course Title: Construction Cost Accounting
Date : May 19-23, 1981
Location : Minna, Bone Bone, Luwu
Participants: Twelve (12) cooperative employees.
Total: 12.
35. Course Title: Operation and Maintenance; Safety
Date : May 29-30, 1981
Location : Metro, Lampung
Participants: Thirty (30 cooperative employees;
twenty (20) from line department,
six (6) operators, 4 RMSS.
Total: 30.
36. Course Title: Meter Reading, Billing & Collecting
Date : June 17, 1981
Location : Sinar Siwo Mego, Metro, Lampung
Participants: Eleven (11) cooperative employees
who will perform meter reading,
billing & collecting tasks.
(8 RMSS & 3 Accounting personnel)
Total: 11.
37. Course Title: Power Plant recording & reports workshop
Date : June 18, 1981
Location : Sinar Siwo Mego, Metro, Lampung
Participants: Six (6) operators. Total: 6.
38. Course Title: Accounting/Reporting, Operating Period
(Mini-workshop; operating period
accounts review)
Date : June 19, 1981
Location : Sinar Siwo Mego, Metro, Lampung
Participants: Eight (8) cooperative employees
(5 accounting & 3 Sekretariat).
Total: 8.

Summary:

38 total courses; 487 participants (215 individuals); 195 days
of formal training.

COMPLETED TRAINING COURSES, NRECA/PLN

A. Incountry Training

1. RE Systems Management
Date : July 3-12, 1979
Location: Semarang
Number of Participants: 25
2. English Language Training
Date : Sept. 3 - Nov. 10, 1979
Location: Jakarta (LIA)
Number of Participants: 10
3. English Language Training
Date : Jan. 7 - March 29, 1980
Location: Jakarta (LIA)
Number of Participants: 11
4. English Language Training
Date : April 8 - April 25, 1980
Location: Jakarta (LIA)
Number of Participants: 11
5. Intensive English Class
Date : July 28 - Oct. 24, 1980
(Sept. 15-26 break)
Location: Jakarta (PLN Pusat)
Number of Participants: 9
6. Intensive English Class
Date : July 28 - Oct. 24, 1980
(Sept. 15-26 break)
Location: Jakarta (LIA)
Number of Participants: 2
7. Intensive English Class
Date : Sept. 29 - Dec. 20, 1980
Location: Jakarta (PLN Pusat)
Number of Participants: 11
8. Construction Supervision and Training Skills
Date : Nov. 3 - Nov. 13, 1980
Location: Semarang
Number of Participants: 36
9. Construction Materials and Equipment Logistics
Date : Jan. 26-30, 1980
Location: Semarang
Number of Participants: 31

PES FILE

1. PROJECT TITLE Rural Electrification I	2. PROJECT NUMBER 497-0267 Loan No. 497-T-052	3. MISSION/AID/W OFFICE Indonesia
	4. EVALUATION NUMBER (Enter the number maintained by the reporting unit, e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) FY 80-9	
<input type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION		

5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING		7. PERIOD COVERED BY EVALUATION	
A. First PRO-AG or Equivalent FY 78	B. Final Obligation Expected FY 81	C. Final Input Delivery FY 84	A. Total	\$ 95.4 mil.	From (month/yr.)	7/1979
			B. U.S.	\$ 39.4 mil.	To (month/yr.)	6/1980
					Date of Evaluation Review	

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., program, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Determination of final action with PLN conductor procurement.	R. Johnson, AID M. Basoeki, PLN	7/15/80
2. PLN to provide adequate financing for headquarter complexes construction.	R. Davis, AID M. Basoeki, PLN	7/31/80
3. PDO to assign vehicles to consultants	B. Hawley, AID S. Awal, PDO	7/15/80
4. PDO to assign full complement of counterpart engineers to C.T. Main.	R. Johnson, AID H. Johnson, MAIN S. Awal, PDO	7/31/80
5. PDO to complete housing for consultants in Lawu.	R. Davis, AID S. Awal, PDO	7/31/80
6. PDO to pay monies owed to NRECA.	B. Hawley, AID P McNeill, NRECA S. Awal, PDO	8/30/80
7. PDO to provide additional floor space for PDO and consultant staffs.	B. Hawley, AID S. Awal, PDO	9/30/80

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS			10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT	
<input type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input type="checkbox"/> Other (Specify)	A. <input type="checkbox"/> Continue Project Without Change	
<input type="checkbox"/> Financial Plan	<input type="checkbox"/> PIC/T	_____	B. <input type="checkbox"/> Change Project Design and/or	
<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C	<input type="checkbox"/> Other (Specify)	<input type="checkbox"/> Change Implementation Plan	
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P	_____	C. <input type="checkbox"/> Discontinue Project	

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Name and Title)		12. Mission/AID/W Office Director Approval	
Dave Devin/Ren Hawley - Project Officer Abe Grayson - PIE Rudy Ellert-Beck - PRO FFZimmerman - Evaluation Officer WGRollinger - DD		Signature: <i>Thomas C. Niblock</i> Typed Name: Thomas C. Niblock, Director Date: _____	

RURAL ELECTRIFICATION - PES
AID LOAN 497-T-052
AID GRANT 497-0267

13. SUMMARY NARRATIVE

This Project Evaluation Summary (PES) represents the second annual USAID review of a multidonor - multi-GOI agency pilot effort to test a model for providing electricity to the rural areas of Indonesia. The model has four key components as follows:

- Areawide Coverage of discrete service areas having 30,000 to 50,000 households. The pilot areas in Indonesia each have between 20 and 110 villages covering approximately 1/3 of a kabupaten. The target in Indonesia is to achieve 50% coverage in the selected project areas within 5 years and 85% within 15 years.

- Economic Viability through reduction in construction costs consistent with reliability and safety and through restructuring of tariffs. The initial costs as well as the minimum monthly bill to the average rural resident can be within reasonably affordable limits. Original estimates were that it would cost about \$500 per household to bring electric service to villagers in Indonesia. (See Sect. 23 below).

- Financial Soundness. The model, if implemented carefully and managed properly, should demonstrate that rural electrification is not merely a social program but can be instituted on a financially sound basis. In many electrified rural areas in other parts of the world, the financial returns are improving markedly over time, though they begin from very low initial levels.

- Productive Uses. If rural electrification is to contribute towards the economic development of an area, it must be placed in a productive context. All projects should include elements designed to stimulate community use and productive use of electricity 24 hours/day.

A. Project Progress Status.

USAID has been working with the Government of Indonesia since the fall of 1975 on the development of this pilot project which will demonstrate the replicability and appropriateness

of the above model as a mechanism for electrifying the rural areas of Indonesia.

Among other things, it was decided to test the above model in ten different areas of rural Indonesia which represent typical Javanese, outer island and transmigration environments. It was further decided to implement the project through two different agencies of the GOI representing a public power company approach which involves extensions of an existing power grid and a private cooperative approach which involves institutional building, beneficiary involvement and the use of isolated diesel power supplies.

The project is a multidonor effort with the Canadian Government (CIDA) financing the generation plants for the three outer island projects and the Royal Netherlands Government (Dutch) financing part of the distribution wiring for the seven Central Java systems. The project financing is as follows:

<u>Country</u>	<u>Amount</u>	<u>Date Signed</u>
USAID Grant	US\$ 6 million	March 30, 1978
USAID Loan	US\$ 30 million	May 6, 1978
CIDA Grant	US\$ 1.8 million *	November 16, 1978
CIDA Loan	US\$ 21 million *	October 13, 1978
Dutch Loan	US\$ 5 million *	March 21, 1979
GOI	US\$ 30 million *	Same as above
TOTAL:	US\$ 93.8 million	

The seven Central Java Systems are being constructed by the State Power Company (PLN) which will also operate and maintain the completed systems. The three outer island systems are being administered by the Directorate General of Cooperative (DGC). The DGC will assist three private cooperatives to design, construct, and operate their own rural electric systems.

The first year of the project (dating from the signing of

* equivalent

the USAID Loan Agreement May 6, 1978) achieved considerable progress in laying the foundations which should result in smooth implementation in future years, including:

- increased PLN & DGC staffs;
- orientation tours of the highly successful Philippine R.E. Program;
- final selection and arrival of consultants (C.T. Main as the consultant for design and construction supervision, and the NRECA for organization, management, operation, maintenance and training assistance);
- preparation of detailed project implementation plans covering organization, construction activities, training, and productive uses;
- construction by PLN using its own "off the shelf" materials of a demonstration project in three villages in Klaten, Central Java;
- the organization and granting of charters by DGC/PDO to its three outer island cooperatives;
- purchase of suitable land at each outer island site for DGC headquarters complexes.

During the second year of the project considerable additional progress has been made towards actual construction and energization of the systems. Some of the significant events since the June 1979 PES review include:

- finalization of PLN and Bank Indonesia Subloan Agreements
- negotiation of three R.E. Coops construction loans with the BRI;
- loan disbursement for training and vehicle procurement for PLN;
- evaluation of bids for the conductors;
- signing of contract between PLN and P.D. Perusda for 16,000 wood poles to the seven sites in Central Java at an average price of Rp 53,000/pole (\$84.80/pole);
- development of engineering and construction progress schedules by C.T. Main for both PLN and DGC distribution

- systems including the headquarters complexes;
- completion of preliminary field staking in all seven of the Central Java Project Service Areas;
 - construction and energization of a PLN demonstration project for three villages in Klaten, Central Java;
 - initiation of construction by the DGC/PDO/RE task force and the Lombok RE Cooperative of a demonstration project for three villages in East Lombok;
 - some progress in preparations for HQ complexes in several locations;
 - completion of several types of training courses and orientation tours for project personnel;

B. Project Issues and Problems

The Rural Electrification project, despite the generally significant progress reflected above in this summary statement and in subsequent sections in more detail, has encountered some delay and now faces a complex set of increasingly serious issues, many of which have arisen due to external factors beyond either the project's control or any reasonable predictions. There are cost overrun problems and new data that raise affordability questions. There are communications problems and differences of perception between consultants and PLN/DGC officials. There are management and coordination problems, contracting and procurement problems and quality control issues. There are even some institutional conflicts between central government and local organizations.

In Section 23 at the end of this PES we have attempted to delineate the nature of these basic issues and describe what efforts are underway or planned to deal with the problems.

14. EVALUATION METHODOLOGY

This is the second evaluation of this project. It is based upon recent field trips to the subprojects sites and discussions with GOI counterparts in PLN, DGC/PDO, other GOI national, provincial and local officials, expatriate consultants from NRECA and C.T. Main, other donor personnel and USAID staff.

AID/Wash. representatives participated in this exercise by undertaking project site visits, assisting in improvements in the PES preparation and attending the Mission evaluation review meeting where their comments helped keep a focus on project issues (discussed in Section 23 below).

15. EXTERNAL FACTORS

(a) On November 15, 1978, the GOI instituted a 50% devaluation of the rupiah against the dollar. This could not have been foreseen in the feasibility studies.

(b) Over the past year, inflation in Indonesia has been approximately 25% and in the U.S. over 12%. Both rates are higher than projected in the feasibility studies.

(c) On May 1, 1980 the GOI raised the prices of kerosene and fuel oil by 50%. At the same time PLN also raised its electric rates by the same amount.

These external factors will no doubt have a negative impact on the success of the project. Just how severe remains a question. The devaluation and increased costs have necessitated rate increases which will undoubtedly reduce both the percentage of people who will connect up and the consumption of those that do. USAID has retained the services of an economist, Dr. Mark Gellerson, to investigate this problem as a part of his economic analysis of the six NRECA/ PLN RE II feasibility studies. His report is expected in about 90 days. An initial discussion of the affordability issue, nevertheless, is provided in Section 23 at the end of this PES.

16. INPUTS

The inputs of the project consist of funding from the GOI, AID, the Canadian and Dutch Governments, technical assistance, and training.

(a) Funding

As of April 30, 1980 \$2,155,046.84 of the AID Grant have already been disbursed for technical assistance and training and \$75,270.44 of the AID Loan have been disbursed. The GOI has expended approximately Rp.1.06 billion (US\$1.7 million) in support of the DGC/PDO and Rp.971 million (US\$1.6 million) for PLN. Although the PLN budget for IFY 79/80 was

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sufficient to keep the seven subprojects in Central Java moving ahead approximately on schedule, USAID has recently been advised that the PLN project budget for FY 80/81 has been cut so that there are not sufficient funds to procure additional poles or to start construction of the seven headquarter complexes. USAID has had a number of discussions on this with PLN and we understand that steps are being taken to restore these funds.

The DGC budget for IFY 79/80 was released late as in past years. Progress was achieved in part due to loans made to the PDO by C.T. Main which totalled nearly Rp 20 million and by the NRECA consultants who have made personal loans to the PDO totalling almost Rp 2 million. See issues Section 23.

USAID and CIDA have also recently been informed by their consultants that, because of incorrect cost estimates and inflation, there is a long range funding problem associated with the local currency portions of the BRI loans made to the three outer island cooperatives. In other words, even though the local currency loans made by the GOI through the BRI to the three RE cooperatives are substantial in size, they are not sufficient to cover the local costs of construction. During the Mission Review, Bank Indonesia and Ministry of Finance representatives indicated that these loans will be increased with no problem.

For the Lampung distribution system there may also be a shortfall on the foreign exchange portion of the project because the pre-design centerline staking shows almost twice the number of kilometers as shown in the feasibility studies. This shortfall could be made up if the GOI will pick up the costs of constructing the headquarter complexes for all three outer island areas and allow the USAID Loan to be shifted as necessary to cover the increased foreign exchange costs of constructing the Lampung distribution system. This, of course, would further increase the local currency shortfall mentioned above. C.T. Main is preparing a revised project cost estimate which will describe this problem in detail. The matter will then be taken up with the appropriate officials in the GOI. ✓

(b) Technical Assistance

(i) C.T. Main

A three-year contract was signed on September 18, 1978 with Charles T. Main International (C.T. Main) to provide 467 person months of consulting services for the design and

construction supervision of the distribution systems and headquarter complexes. C.T. Main personnel are stationed in Central Java and on the three outer islands and in Jakarta. As work progressed on the PLN portion of the project in Central Java, it soon became evident that an additional electrical engineer for systems design was needed as well as a civil engineer to assist in the design and supervision of headquarter complexes.

On the DGC portion of the project, C.T. Main has encountered considerable difficulty because of the lack of budgetary support from DGC due in part to low original estimates that resulted in low budget provisions which, in turn, could not be corrected in mid year; because of the remoteness of the project areas; and because DGC was unable to provide the high quality and experienced local contractor for technical support originally expected by C.T. Main. (Note: DGC is of the opinion that the project contracts are too loosely written in that they do not provide specific details on the type of experience and training required for C.T. Main and NRECA consultants and for DGC personnel). In February of 1979 it was agreed that the best solution to this problem would be to augment both PDO and C.T. Main staff in order to make up for the deficiency. The DGC agreed to increase PDO's staff by six electrical engineers and four draftsmen. C.T. Main agreed to provide three electrical engineer designers/trainers, a drafting supervisor, and a civil engineer to coordinate the design and supervision of construction of the headquarter complexes.

After considerable delay a contract amendment was negotiated and signed on March 3, 1980. The amendment calls for 221 additional person-months plus funding to allow C.T. Main to subcontract for site surveys, soils investigations and design of the headquarters complexes. Including the new positions, C.T. Main will have 18 long term personnel on board and should have sufficient staff to carry out their contract. For additional discussion see Section 23 on Issues below.

(ii) NRECA

A three-year contract was signed on August 23, 1978 with the National Rural Electric Cooperative Association (NRECA) to provide 298 person-months of consulting services in organization, operation, maintenance and training.

Although the team leader arrived in November 1978 the team was not completely assembled until March 1979. NRECA personnel are stationed on the three outer islands, Jakarta, and Central Java.

The team has assisted both DGC and PLN in their preparation of implementation plans and in the establishment of demonstration projects in Central Java, Lombok and Lampung. Their main thrust has been to assist DGC/PDO with the development and organization of the three island cooperatives as well as provide management assistance and training to both PLN and the cooperatives.

On January 3, 1980 an amendment to NRECA's contract was signed to provide an additional 54 person-months of service. This extension provided for an additional 18 months of service for both the team leader and the training officer as well as 28 person-months to assist PLN and DGC to conduct feasibility studies for RE II.

(iii) SANDWELL & COMPANY

The CIDA grant provides for 325 person-months of technical assistance for the design and construction of the electricity generation plants for the three outer islands as well as training in their operation and maintenance. A contract was signed on May 18, 1979, with the Canadian firm of Sandwell and Company for these services.

Sandwell has made three visits to Indonesia since the signing of the contract and now intends to provide a resident representative about mid-June. IFB's for generation equipment have been published and contracts should be signed by late summer.

(c) Training

During the first year of the project, training plans were prepared by both PLN and the PDO with the assistance of the NRECA Training Consultant as part of the overall implementation plan. Over the first four years, PLN plans to train 758 people in 22 in-country training courses and 71 people in the U.S. and in the Philippines. Likewise, in the same time period, the DGC/PDO plans to train 350 people through 30 in-country training courses and 32 people in the U.S. and in the Philippines. Estimates are that this training program will cost approximately \$920 thousand instead of the \$600 thousand provided for in the USAID Grant and Loan Agreement. The reason for this increase is that both the numbers of people to be trained and the numbers of type of training courses have been significantly expanded over the estimate made in the Project Paper. For example, the PP estimated that 300 Coop and only 140 total PLN staff would receive training. Both the GOI and USAID agree on the importance of this training

to project success and funds are being sought by both parties to provide this training.

To date PLN has trained 92 people in 2 in-country training courses and 18 people in the U.S. and in the Philippines. During the first two years DGC/PDO has trained 168 people in 8 in-country training courses and 1 person in the U.S. and Philippines.

Under separate contracts, AID has also provided 4 months of consulting services of a Productive Uses Planner and 4 months of an expert to conduct an Environmental Assessment (EA). Many of the ideas taken from the report of the Productive Uses Planner were incorporated into the implementation plans of both PLN and the DGC. The EA is still underway.

17. OUTPUTS

(a) Plans, Specifications and Procurement Documentation (IFBs)

The implementation plans prepared by PLN and DGC/PDO are very comprehensive plans and among the best USAID/I has ever received on any project. While flexible, they described in considerable detail how the subprojects will be organized and constructed as well as the training activities and the program for stimulating productive uses of electricity. Both agencies are to be commended for the high quality of these plans. Over the past years, these plans have been used repeatedly as reference guidelines both as background material for new people coming into the project and as reminders of past agreements.

Mapping and preliminary staking of all seven Central Java sites has been completed. A total of 3,017 kilometers of three phase primary feeders and associated single phase and primary taps have been staked.

Likewise 1,705 kilometers of lines have been staked and 624 field staking sheets have been prepared for the outer island subprojects. This represents 85% of the estimated total for Lampung, 80% for Luwu and 40% for Lombok. The lower figure for Lombok is a result of original miscalculations in staking by the consultant.

PLN, with C.T. Main assistance, has issued IFBs for tools and construction equipment, conductor, and distribution

material. PLN's housewiring IFB is in final stages of completion. The bids for the tools and construction equipment were opened February 7, 1980. They have been evaluated and letters of intent have been sent to the eleven selected suppliers. PLN has already signed a contract with a local supplier to deliver 16,000 wood poles to the seven Central Java sites. Additional discussion is provided in the issues section under item #23 at the end of this report.

The DGC/PDO/RE with C.T. Main's assistance is in the process of issuing IFBs for wood poles, distribution material, conductor and generation facilities for all three RE coops. The housewiring material IFBs are also in final stages of completion. The DGC/PDO/RE has issued IFBs, held bid openings, evaluated bids and signed procurement contract for the distribution material, poles, conductor and housewiring material for the Lombok Demonstration Project. There have still been no signed procurement contracts for the Lampung Demonstration Project.

(b) Headquarters Complexes

Both the DGC and PLN have bought the necessary land for all ten headquarters complexes. PLN has entered into a contract with Gajah Mada University for site surveys and soils investigations of the seven Central Java sites. This work is now underway and is scheduled to be completed in August 1980. The designs and construction drawings for the PLN sites are in preliminary stages of preparation. The C.T. Main civil engineer responsible for the design and supervision of construction of the DGC headquarters complexes has just arrived in Indonesia. The design and construction of the outer island headquarters complexes have been delayed pending his arrival. However, it is expected that, together with the PDO engineers and the Coops staff, C.T. Main will now be able to move ahead expeditiously to design and supervise construction of the three outer island headquarters sites within the next two years. Special effort will be required to get the warehouses completed before the project construction materials arrive.

Currently there are two project issues with respect to the headquarters sites. On the outer island sites, the DGC/PDO purchased the land before the coops were legally formed and before the construction loans were negotiated and signed between the three RE Coops and the BRI. Now that the RE Coops have been formed, with elected Boards of Directors, and they have construction capital, it is recommended by the

NRECA that the DGC/PDO sell or grant the land (possibly on a 99 year lease) for the headquarters to the cooperatives. The DGC/PDO agrees that the RE Coops should own their own land but the method of ownership transfer is still undecided.

On the PLN side, it may be that some of the administrative functions, i.e. billing and collections, will be done out of more central locations. If this were to happen, the size of some of the administrative offices could be reduced. The NRECA has made some recommendations on this issue. They need to be reviewed and a policy decision made by PLN.

(c) Operating Electric Distribution Systems

During the first year of project implementation, PLN, using its own materials, constructed and placed in operation a demonstration RD Project covering the first three villages leading out from the Klaten substation in Central Java. This involved construction of 13 km of three phase and single phase lines, 26 km of secondary underbuild, the setting of 483 poles, installing 32 transformers and the wiring by June 1, 1979 of over 600 houses. Since then a total of 1868 houses representing 93.4% of the total houses in these three villages have been connected up. The average KWH of use/customer of about 30 KWH/month has exceeded the estimate of 22 KWH/month contained in the feasibility studies. Also the average bill of approximately Rp 2,000 has exceeded previous estimates of peoples' ability to pay for electricity in these areas. As of May 15, 1980 only 44 customers have been disconnected due to failure to pay their electric bill and of these 36 have been reconnected after full payment of past bills including a Rp 200 late charge and a reconnection charge of Rp 300.

The DGC is now constructing a similar demonstration project covering three villages in East Lombok. By August 1980 it is expected that nearly 2,000 homes in these three villages will be enjoying the benefits of electricity.

(d) Internal Housewiring

Both PLN and DGC have developed basic designs and material specifications for housewiring as well as guidelines for implementing the housewiring program. These guidelines include procurement, material handling and storage and the details of a loan program which would create a revolving fund to be used for replenishing supplies of housewiring materials. Eventually this revolving fund will be used to

support the productive uses program.

As mentioned above some 1,868 houses have already been wired in the Klaten Demonstration Project Area. The East Lombok RE Coops have likewise wired 1300 houses.

(e) Training Courses Completed and Trained Personnel

In-country training courses have been held for PDO staff, the Coops Boards of Directors, the Auditing Committees, temporary managers, bookkeepers, financial managers, linemen and electricians as well as other local government officials associated with the outer island projects. A total of 260 Indonesians have now received in-country orientation training in support of the outer island subprojects. PLN has also held a two week "General Orientation to RE" training course in Semarang. This course was attended by 25 prospective managers and division chiefs of the seven Central Java RD systems. PLN sent two groups totalling 19 prospective managers and division chiefs to the United States and the Philippines for 3 months of on-the-job training.

In addition, 87 Indonesians have been sent for orientation tours of the highly successful Philippine Program. This includes 45 PLN officials and 42 DGC/PDO staff and local government officials.

(f) Billing and Collection System

A short-term consultant from NRECA worked with PLN and the DGC for about six weeks in the design of an accounting system for the project. The NRECA has also made recommendations for billing and collecting, but implementation will have to await energization of the systems. The billing and collection systems in the demonstration project is the same as PLN's present system for urban customers in Central Java and is being handled by personnel from the Klaten PLN sub-branch office

18. PURPOSE

The purpose of this project is to demonstrate that electricity can be provided to the rural areas of Indonesia at a price which the majority of the people can afford through systems which are technically sound and financially viable and that the introduction of electricity to the selected areas

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will bring about a significant increase in production and employment opportunities and improve the quality of life of the rural poor. Another purpose is to train a sufficient cadre of Indonesian experts in all phases of rural electrification so as to manage and expand the program.

While it is too early to evaluate the project purpose, USAID remains optimistic that by 1983 the End of Project Status as described below will be achieved.

(1) Seven rural areas in Central Java including over 400 villages will be provided with reasonably priced, reliable electric power 24 hours a day from the PLN grid. These areas have a combined population of over 1.3 million people including approximately 260,000 families. It is expected that at least 50% of these people will enjoy the benefits of electricity in their homes and nearly all the people living in these areas will benefit through street lighting, the lighting of schools and other public buildings, the increased use of refrigeration and ice in markets and restaurants, the use of irrigation pumps, potable water pumps and other productive usages.

(2) Three rural areas in the outer island districts of Central Lampung, East Lombok and Luwu including almost 200 villages will be provided with reasonably priced, reliable electric power 24 hours a day by member-owned and managed electric cooperatives. Likewise the combined population of these areas is over 650,000 including approximately 130,000 families and it is expected that at least 50% of them will be connected to the system. All the other people in the area will benefit in much the same manner as described above for the Central Java systems.

(3) A three-phase backbone system expandable to serve additional residents in all these areas.

(4) An active power usage program at each of the ten areas which is working with local leaders and private individuals to promote a whole host of productive power use projects and enterprises.

(5) The existence at each site of a three to four hectare headquarters site (six or ten Ha. in the outer islands) complete with office space, warehouse, storage yard, maintenance facilities and, as necessary, staff housing.

(6) Each system will have a fully trained and functioning management and operating staff to operate, maintain

and expand their services.

(7) Both PLN and the DGC will be fully capable of organizing, financing, designing, procuring materials for, supervising construction and initial operation of rural electric systems.

(8) The project will have been continually evaluated during implementation and the first three years of operation.

This evaluation will provide a continuous flow of feedback information to the GOI and USAID project managers and will indicate the linkages between project purpose and the sector goal.

19. PROGRAM OR SECTOR GOAL

The goal of this project is to improve the standard of living and increase employment and productivity of the rural population in ten selected areas of Indonesia.

Again, while it is too early to evaluate this goal, USAID is optimistic that the provision of electric power to these areas should bring a new dimension to the package of existing rural development programs that together will improve productivity and employment opportunities as well as raise the quality of life for the people who live in the target areas.

There are a very large number and variety of potential productive uses of electricity in these ten rural areas, most of which could benefit the poor and the very poor. A partial list would include rice and other grain mills, irrigation, poultry farms, sugar processing, copra, tobacco and other food processing, refrigeration in shops and restaurants, sawmills and box factories, rattan furniture and other wood-working shops, hollow blocks, floor and roof tiles and pottery factories, blacksmith, machinery and repair shops, food, pharmacy and general merchandise stores. Many of these activities already exist in the target areas using substitute forms of power. However, in other countries, the extension of electricity to the rural areas caused significant increases in the number of new activities as well as increased output from existing farm, commercial and agro-industrial enterprises.

There is strong reason to believe that this will also occur in Indonesia.

In addition to stimulating production in the selected areas, the introduction of electric power into these rural areas should generate considerable employment thus making a contribution to one of Indonesia's more intractable problems. For example, one Co-op in the Philippines reports that in the four years since energization, twenty-five new business enterprises have been established creating a total of 430 new jobs. This does not count additional employment generated at the existing firms or home industry, e.g., handicrafts. Also each system will employ over 100 people in management, operation and maintenance. Extrapolating from this example we estimate that the ten utilities planned to be established in this proposed project should create at least 5,000 new jobs in small to medium scale industry plus untold thousands of new employment opportunities for home and handicraft industries. The project may also demonstrate that further indirect benefits to rural residents will occur through the impact of electricity on such things as potable water supply, quality of health services, availability of education and training, and the nature and quality of government services.

20. BENEFICIARIES */

The numbers of target villages and households at the proposed project sites are given below:

Site	No. of Target Villages	Pop. of Target Villages	No. of Target Households **	Est. Target Pop.	Village Pop. Density ***
A. <u>Central Java</u>					
Pek-Pem.	102	242,120	20,000	102,000	1141
Klaten	98	245,105	25,000	120,000	2003
Bant.-Sleman	21	169,964	20,000	84,000	1403
Sragen	47	139,278	15,000	70,000	1132
Magelang	83	175,630	20,000	100,000	1002
Wonogiri	54	167,081	15,000	81,000	872
Banyumas	35	145,301	15,000	75,000	791
B. <u>Outer Islands</u>					
Luwu	65	132,263	15,000	85,000	34
Lampung	108	272,505	25,000	150,000	590
Lombok	34	262,312	25,000	115,000	828
TOTALS:	647	1,952,559	195,000	983,000	-

* Based upon assumption that 50% of households would connect to the system, an assumption which was made for planning purposes and which has since been confirmed to be within reason by various social/economic surveys. (Also see attachment).

** Based on average household size at each site.

*** No. of persons per sq. km of village land.

Thus, a total of 195,000 households (composed of, as shown above, an estimated 983,000 people) in 647 initial target villages will immediately and directly benefit from the project spread effects (through street lighting, the lighting of educational and public buildings, potable water pumps, increased jobs and productivity resulting from more activity in the formal

and informal economic sectors, etc.) The project will almost immediately benefit the remaining 1,000,000 people of the target villages even if their households are not electrified. The cost of the project (\$93.8 million) should be less than \$100 per primary beneficiary and less than \$50 per secondary beneficiary.

Tabulations of the data gathered by the 1977 survey of these areas show the following classification of the proposed beneficiaries by primary occupation of the heads of household

Primary occupation of household head	No. of household head	%
Farmer	44,743	60.0
Wage laborer	18,200	24.4
Salaried	6,454	8.6
Tradesman	4,078	5.5
Cash crop farmer	1,122	1.5
TOTALS	74,597	100.0

From the above table it can be seen that the proposed direct beneficiaries will be the rural poor; the small farmer, the daily wage laborer and the small entrepreneur. Together, they total some 90% of the 74,597 sample households.

From further analysis of the survey data it can be stated that:

(a) The vast majority of the farmers in these areas (37,045 or 82.3% of farmers) cultivate less than one hectare of land; this is at or below the national average holding of 0.98 ha. In general, especially in Java, the land holdings of the cash crop farmers conform to this pattern. Because of this, they are forced into secondary, tertiary and even quaternary occupations to sustain a livelihood so that the line between small farmers and daily wage laborers is hard to delineate. Wage laborers rarely earn over Rp 500 (\$.80) a day;

more usual is half that sum.

(b) Tradesmen are also generally engaged in small-scale enterprises. Of 4,078 tradesmen, 3,499 (86.0% of tradesmen) have a maximum of two employees.

(c) Salaried and professional people, including civil servants, amount to 8.6% of the total sample households and usually constitute the village elite.

(d) Transmigrants (i.e., settlers in newly-opened lands in islands outside of Java) are the predominant potential direct beneficiaries in Lampung and, to a lesser extent, in Luwu. In the latter site, however, many of the possible beneficiaries have never had the opportunity for participation in the national life of the country. The provision of electricity will aid considerably their efforts in this direction.

21. EFFECT TO DATE

The project has already caused a great deal of discussion and debate among policy makers within the GOI. They well understand the linkage between RE and Rural Development and have attached priority to the project. These discussions have resulted in the lowering of the burden to consumers, by extending credit for connection and construction costs, the trial use of kilowatt hour meters for small consumers, and the acceptance of rural electric coops, at least on a trial basis, as a complementary institutional vehicle for rural electrification. It is expected that the project will eventually convince the GOI leadership that the model being demonstrated is replicable, appropriate and can be used to electrify the entire country in a financially sound manner.

22. LESSONS LEARNED

1. USAID is learning that consultants can be mobilized more rapidly and work more effectively when the GOI is relieved of the burden of logistical support requirements. USAID took a significant step in this regard by providing housing for the Jakarta, Lampung and Lombok based consultants and some of their vehicles.

2. In planning future projects, more precise attention should be given to defining the duties and responsibilities of the consultants as well as their working relationships with

their counterparts.

3. More lead time should be allowed for mobilization of the consulting teams and for the provision of local support. A possible solution for alleviating some of the start-up difficulties in the future loans would be to provide for a small draw-down on project loan funds for this purpose prior to satisfaction of all conditions precedent to disbursement for major procurement.

4. Every attempt should be made to keep to a minimum number of conditions attached to the loan agreement.

5. USAID should ensure that it has adequate personnel to support a project of this magnitude.

23. ADDITIONAL REMARKS: ISSUES

As in most rural development projects there is no shortage of issues or problems. We have decided to present these issues together in this section of the PES rather than scatter them throughout different sections where their true significance might be either misunderstood or overlooked.

A. Affordability/Economic Viability

The major issue in RE for both the PLN and DGC is the question of affordability and economic viability of the project. Part and parcel of this problem is that of cost overruns. Both of these issues were presented to GOI officials at the Mission Review in the format below:

1. Financial soundness versus people's ability to pay

One of the key components of the USAID model for Rural Electrification which this project is trying to demonstrate is financial soundness. USAID has never suggested that PLN undertake electrification of the rural areas of Indonesia primarily as a social program. We are optimistic that, with properly designed rates and assuming that the project will be implemented in an economical manner and managed properly, it can be instituted on a financially sound basis given the concessional financing built into the original project design.

In this regard, the results of the Klaten demonstration project have been quite encouraging. We have seen at Klaten that (1) a higher percentage of the people in the three villages have connected up than expected. (That is 93.4% in the first year, versus our target figure of 50% in three years).

(2) people have been willing and able to pay more for electricity than was assumed in the feasibility studies (an average bill of Rp 2,000 vs Rp 1,500).

(3) the monthly consumption of electricity per customer of 30 kwh exceeds the estimate of 22 kwh in the feasibility studies.

It is recognized that the three demonstration villages are more affluent than the average villages to be served by the project. Moreover, the recent increases in PLN's rates and the design of the tariff structure have serious implications for both the rural people's ability to pay for electricity and the financial soundness of the project. According to information received from PLN's Subdirectorate for Rural Electrification, residential consumers in the project sites will now have to pay a monthly bill of approximately Rp 3,000 for 22 kwh consumption during the first four years. This is accounted for as follows:

First four years (22 kwh)

Connection charge installment	Rp 625
Demand charge (450 VA)	Rp1,260
Kwh charge (22 x Rp 23)	Rp 506
Fuel surcharge (22 x Rp 6)	Rp 132
Housewiring installment	<u>Rp 410</u>
Monthly bill	Rp2,933

According to the present tariff structure, this bill will be reduced after four years due to the final payment of the connection charge and housewiring installments. Thereafter, the low voltage RE customer will have to pay approximately Rp 1.898 per month for 22 kwh consumption.

We have three questions regarding these new rates.

(1) What is the effect of the new rates on the ability of the rural people to pay? This question relates to the percentage of customers who will connect up and their monthly consumption of electricity. Obviously, if the rates are too high the project will not benefit large numbers of people in the lower income groups, i.e., PLN will not achieve area wide coverage and there will also be a loss of revenue due to restrictions in consumption by those who do connect up.

Recent surveys by the rural sociologist who has prepared a report on the social soundness for the feasibility studies for the six new PLN R.E. systems show that only 12% of the people in these areas could afford to pay Rp 3,000 or more for electricity, 21% could afford Rp 2,500 or more, and 40% could afford to pay Rp 2,000 or more. If this is true, then it would seem that the new rates are too high for the average rural household and that PLN should consider ways to reduce the minimum monthly bill to under Rp 2,000.

Additional information on ability and willingness of villagers to pay the higher charges is needed. This information will be needed prior to authorization of RE II. The findings of the rural sociologist can be tested over the next 6 to 8 months in the Klaten pilot area as well as in test villages, i.e., Lombok and Lampung.

(2) What is the effect of the higher costs of project construction and the higher costs of operation and maintenance on the financial viability of the system?

While our economist has barely started working on this problem, we understand from PLN sources that the long range marginal costs of delivering electricity to low voltage rural customers in Central Java is around Rp 110/Kwh. And we understand from PLN's Subdirectorate of Rural Electrification which has done some computer runs of the financial forecast of the six new PLN RE systems that the minimum bill for 22 Kwh needs to be around Rp 3,000 as shown above to achieve a positive cash flow within five to seven years. However, our economist has estimated that, over the fifteen year project life time and assuming connection rates and usage do not change, the same revenues would be generated by imposing a straight per Kwh charge of Rp 81 for residential consumers and removing all other charges. However, these revenues would be generated later in the life of the project so the present value of the cash flow would be reduced. Under this straight

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per Kwh charge, the average monthly bill for low voltage rural households could be reduced to about Rp 1,782 (assuming 22 Kwhs consumption). Therefore, it seems likely that the number of connections might increase, which would actually lead to an increase in revenues. Moreover, such a straight per Kwh charge would provide a steadier source of revenues and more closely reflect the long run marginal costs of supplying electricity in the PLN system. The possibility of this approach to rates will be explored. Second, if the per Kwh charge for commercial consumers was increased by, say Rp 19, this might allow the per Kwh charge for residential consumers to be lowered to about Rp 77 while still generating the same total revenue. Of course, such an increase in the per Kwh charge to commercial consumers might reduce the number of commercial connections; but, any reduction might be small if electricity costs are small relative to other production costs (and if they remain below the costs of alternative forms of energy). In addition, residential consumption would likely increase since the typical monthly bill would be reduced to about Ro 1,694. Also it does not appear that the higher rates would have much of an effect on the ability of commercial consumers to pay. This possibility will likewise be explored as a way of dealing with the problems of heavy costs to small consumers.

(3) If the people can afford to pay more than we expect for electricity, why would PLN opt for a tariff design which results in a significant reduction in the average monthly bill after four years of operation as shown above, especially since this reduction would result in revenue below the long run marginal cost of supplying electricity? It would seem to us that PLN might instead charge less for electricity in the initial stages of the project with the understanding that there will be increases in the future, not planned decreases.

Contrary to popular belief we feel that the rural poor of Indonesia can afford to pay for electricity at PLN's long range marginal cost of delivery. For example, a poor person who only uses 15 Kwh/month (say 3 low voltage light bulbs used six hours per night and a convenience outlet used for a radio one hour per day) would only have to pay Rp 1,650 per month if he was charged Rp 110 per Kwh. This would seem to indicate that the poor rural people are actually subsidizing the larger consumers under the present PLN rate structure!

In summary, we feel that if the GOI and PLN are serious about electrifying the rural areas of Indonesia then an appropriate tariff structure should be designed that will

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both allow large numbers of people to enjoy electricity and will also improve PLN's financial position.

2. Economic Viability and Cost Overruns

This topic is directly related to the above issue because, if costs of procurement, construction, operation and maintenance can be reduced, these savings can result in more customers being connected and ultimately a lower monthly electric bill.

The project was originally designed to serve approximately 130,000 customers by the third year of operations. Project financing included US\$ 20 million from the USAID and US\$ 12 million equivalent in Rupiah from the GOI. This \$32 million package would have resulted, therefore, in an average cost per customer of US\$ 246. After the USAID Loan Agreement was signed, the Royal Netherlands Government (RNG) decided to contribute an additional US\$ 5 million equivalent in Guilders to further expand the system. At \$246/customer this should result in at least 20,000 additional customers. In fact, because the USAID assistance also included infrastructure development like headquarters complexes, the additional Dutch contribution should have resulted in perhaps 30,000 new customers. However, recent cost analysis based on current cost data indicates that the project faces substantial cost increases. USAID has identified potential cost savings which would not compromise the construction and performance of the system:

- (a) Reduction of requirements for tools and construction equipment;
- (b) Installation of a fully adequate but smaller size internal housewiring than currently used by PLN;
- (c) Re-opening the tender for conductor to include international suppliers; and
- (d) Elimination of transformer taps.

PLN representatives were not prepared to discuss these issues during the Mission Review meeting. They asked for more time to review the issues paper we had prepared. Since the review, however, PLN and USAID have commenced a series of small meetings to resolve each sub-issue; agreement has been

reached on reduced quantities of tools and equipment, and alternate bids will be requested for housewiring and transformer. PLN is concluding the negotiations with the local bidders for conductor and has agreed to re-open the tender to international suppliers if negotiations prove unsatisfactory.

In summary, total project costs now exceed US\$ 40 million compared with US\$ 37 million as originally budgeted as shown below: (All figures US\$ 000)

Items	Original Budget			Current Estimate		
	AID	RNG	GOI	Full Bid	Alter-nate	Savings
Tools & Equip. Grounding	included in #2 & 6			3,272*	2,638	634
Distribution Hardware	14,538			9,600	9,600	
Distribution Line Conductor		5,000		7,164	3,799	3,365
Housewiring, Materials and Meters	2,500			5,968	5,708	259
Wooden Poles			included in # 7	4,250	4,250	
Headquarters Complexes	2,462		1,050	3,512	3,512	
Distribution System Construction			7,382	1,900	1,900	
Headquarters Complexes Construction			included in # 7	1,232	1,232	
Miscellaneous Start-up	500		3,568	4,068	4,068	
TOTAL	20,000	5,000	12,000	40,964	36,707	4,257

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Since both the AID and the RNG contributions are fixed, PLN has to decide whether to make up for the short fall or adopt the proposed alternative.

* This figure is based upon the procurement of 142,000 groundrods and other changes in the grounding materials.

B. GOI Support and Management for the Project

The problem of adequate GOI support relates mostly to the DGC portion of the project. PLN's performance to date has been most satisfactory in respect to housing, offices, office supplies, engineering backup services and other local support. PLN officials sent abroad for training or orientation have been well qualified. Most impressively, PLN, using over Rp 600 million of its own materials and internal funds, has constructed a demonstration rural electrification system in three villages near Klaten, Central Java which is already serving over 90% of the 2000 households in these villages. This pilot project was planned, staked and, completely built in 4 months by force account with assistance from the consultants.

The DGC's lack of support has been very much a function of poor organization and its inadequate Rupiah budget.

- Organization

The DGC has formed a new Project Development Organization (PDO) but the PDO has not yet proven sufficiently effective in implementing the project. Part of the problem may be the PDO is still part of DGC rather than functioning as a separate entity. In any events, there have been serious staffing and budgeting problems. The lack of a formal organization, the periodic reassignment of personnel, the absence of firm direction and follow-up, and the lack of coordination among the staff make it difficult for the consultants to work effectively with the PDO.

There is now a new organizational chart for PDO, and there have been several improvements in administration. Further improvement is anticipated following the recent appointment (April 1, 1980) of a very competent individual from the Ministry of Trade and Cooperatives as Project Officer for R.E., directly accountable to the Minister.

Budget and Finances

During the first year of the project, an inadequate budget

resulted partly from a mistake in estimate of costs. Last year USAID was promised there would be a Rp 1.4 billion budget for IFY 79/80 which would have been adequate. This budget should have been approved by BAPPENAS in June and released by August 1979.

Subsequently, USAID was disappointed to learn that the DGC did not even submit their budget to BAPPENAS until August and the request was for only Rp 760 million. While this inadequate budget has been released since October, we have little knowledge of how these funds have been expended to date. Only recently did the PDO repay Rp 20 million loaned to the PDO by C.T. Main. This loan represented expenditures over the past year by C.T. Main on behalf of the PDO. The loans made to the PDO by NRECA personnel have yet to be repaid.

- Luwu Housing

Under the Grant Agreement Implementation Letter No. G-2, USAID agreed to rent housing for the consultants working in Jakarta, Lampung and Lombok; PLN agreed to furnish housing for the consultants working in Semarang; and DGC agreed to build five three-bedroom houses in Luwu. It has been almost two years since this Implementation Letter was signed. While PLN provided housing as required, the DGC housing on Luwu is still under construction. In the interim, the consultant staff working in Luwu has rented and rebuilt a house at a cost to the project of over Rp 9 million. DGC states that the houses will be completed in July 1980.

In summary, therefore, as of the Mission Review, USAID was still waiting for the following actions from DGC/PDO:

- (1) Evidence that the PDO has adequate financial resources to function effectively;
- (2) Repayment of monies owed to NRECA;
- (3) Assignment of the full complement of counterpart engineers to C.T. Main;
- (4) Provision of additional floor space, estimated at approximately 300 sq. meters, to effectively accommodate the PDO and consultant staffs;
- (5) Completion of the houses in Luwu, complete with water, electricity and furniture with the space requirements agreed to by the DGC in Implementation Letter No. 1 to the Grant Agreement;

(6) Vehicles assigned to the consultants in accordance with the above mentioned Implementation Letter No. 1.

During the Mission Review, all of these general support related issues were discussed and some further assurances or actions were offered, to wit:

- adequate budget was now available for the project;
- the housing problems would all be resolved by July 1980;
- vehicles would be assigned within the next few weeks if not immediately; and,
- the remaining 3 issues would need to be further discussed but DGC is willing and eager to do so with the objective of resolving them in the immediate future.

C. Consultants' and USAID's Performance

The support issues outlined above, however, are only part of the problem. The DGC believed that there are also shortcomings on the part of the American consultants. These include misassignment and improper tasking of personnel; inadequate time on the job; slow performance in completing cost estimates, feasibility reports, and IFBs; and poor reporting on project progress as against planned progress. There are also communication problems between consultants and GOI officials and between the two consultant organizations (C.T. Main and NRECA).

During the review, both consultants agreed that they have had their shortcomings. They are of the opinion now, however, that these are pretty well under control, and one NRECA member even suggested that perhaps the air is now cleared: "We have all been too fractious in the past. If now we can all be more cooperative, this project can move ahead quickly".

Regarding USAID support for the project, the DGC Project Manager was of the opinion that it has been generally "beyond what would be normally expected". He did note, however, that there have been communication problems between GOI officials from both DGC and the PLN and the USAID project staff. Such problems in communication often result from the changes in attitudes, standards and practices necessitated by the novel approach to electrification presented by this project and from the tensions inherent in expediting such a large-scale development effort. Whatever their cause, these difficulties in communication for both the consultants and USAID with the GOI and even between the consultants and the USAID project staff will need to be overcome if effective consultation and working relationships are to be developed.

D. Cooperatives' Participation

The credibility of the cooperative concept for rural electrification is also an issue. During their field trip to Lampung, in particular, the AID/W team found some dissatisfaction among Cooperative Board members because they did not feel they were really participating in decisions. DGC or its representatives seemed to make all decisions and the Coop merely rubber stamped.

The DGC recognizes this dissatisfaction and agrees that the Coop roles have to be improved and broadened, but points out the need for stewardship before much real authority can be turned over to the Coops themselves. This is a point well taken and emphasizes the need for continued upgrading of Coop institutional capability in order to transfer full authority to the Coops at an early date.

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MEMORANDUM

TO: PPC/E, Mr. Robert J. Berg
FROM: AA/ASIA, John H. Sullivan
SUBJECT: Indonesia Rural Electrification I Project

I have reviewed the subject PES and your memorandum of November 19. The PES accurately reflects the limited progress achieved at this early stage in the project's implementation. Its tone is definitely upbeat, but I do not agree with you that this PES attempts to sell R.E. II, which is not mentioned.

You suggest that the PES should be bounced because of what it does not say about the problems being encountered in the project. I disagree. The Bureau is aware of the many problems which have been encountered in R.E. I through routine cable traffic, TDYs, the Mission's weekly reports and contractors' monthly reports.

We have put the Mission on notice that AID/W will want to see signs of progress under R.E. I which indicate the program is heading in the right direction--in terms of who benefits and how, productive and communal uses versus consumption uses, institutional capacity, and socio-economic viability--before R.E. II is approved. A copy of the most recent cable we sent on this subject, which was prepared with the assistance of PPC/E, is attached for your information.

Attachment: a/s

cc: USAID/I:DDevin

Clearances:
ASIA/PD:MMPh1 (draft)
ASIA/PD/ENGR:WHodgin (draft)
ASIA/DP:RHalligan
ASIA/ISPA:RDakan (draft)
DAA/ASIA:FWSchieck

ASIA/PD/EA:RJAsselin:lr/fcd:12/7/79:Ext 235-8582

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UNITED STATES GOVERNMENT

Memorandum

- 1. JMY _____
- 2. NWS _____
- 3. JHS _____

John P. ...
497 0261

CY: ASIA / ISPA
ASIA / EMS
ASIA / PDI

Nov 20
DATE: November 19, 1979

TO : AA/ASIA, Mr. John H. Sullivan

FROM : AAA/PPC/E, Robert J. Berg

SUBJECT: Indonesia Rural Electrification I Evaluation, dated June 15, 1979

Subsequent to my reporting to you on my summer trip, AID/W has formally received the attached evaluation. As you will recall, this is the evaluation about which I had reason to believe there are serious problems.

More an attempt to sell Phase II!

We hope to take a number of steps to assure that the evaluation work done by the Agency is of a reasonable and high quality. In the attached case, there is firm reason to believe that this is not an evaluation but, rather, is an attempt to sell Phase II of the project. The Indonesia Mission is capable of far better work.

Has the Asia Bureau taken any steps to bounce this evaluation? Are there steps being taken to ask the Mission to disclose the problems on the project which it knows about? *- NO*

- not in habit of doing this but informed
- guidance on next II sent

While recognizing that your Bureau has opted to review but minimally the routine Mission evaluations, this would seem to be too important a case to pass over lightly. I would be happy to meet with you or any of your colleagues to discuss further this evaluation.

Attachment: A/s

cc: AA/PPC, Alexander Shakow

A BUREAU
ACTION: ASIA / DP
DUE: 11-28
FILE: INDONESIA / PRM
INFO: JS - FS - SIF



5010-110

11/26/79

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

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CLASSIFICATION
PROJECT EVALUATION SUMMARY (PES) - PART I

Report Symbol U-447

PROJECT TITLE

Rural Electrification I

2. PROJECT NUMBER (497)-
0267-Loan 497-T-
052

3. MISSION/AID/W OFFICE
Jakarta

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code Fiscal Year, Serial No. beginning with No. 1 each FY) 79-1

REGULAR EVALUATION SPECIAL EVALUATION

KEY PROJECT IMPLEMENTATION DATES

From FY 78	To FY 83	Final
Final	Final	Final
Subsequent	Expected	Collected

6. ESTIMATED PROJECT FUNDING

A. Total \$ 93 M
B. U.S. \$ 36 M

7. PERIOD COVERED BY EVALUATION

From (month/year) 3/78
To (month/year) 6/79

Date of Evaluation Review

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; the latter items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., Ngram, SPAR, PID, which will present detailed request.)

B. NAME OF OFFICER RESPONSIBLE FOR ACTION

C. DATE ACTION TO BE COMPLETED

There are no major issues or actions which require the attention of AID/Wash. or the Mission Director at this time.

David Devin
USAID Project Officer

Clearances:
FTE: REDavis
PRO: RZimmerman
PRO: RCohen

(Handwritten initials and signatures)

Drafted by: David W. Devin, Project Officer

9. INVENTORY OF DOCUMENTS TO BE REVIEWED FOR ABOVE DECISIONS

- | | | |
|--|--|--|
| <input type="checkbox"/> Project Paper | <input type="checkbox"/> Implementation Plan e.g., CPI Network | <input type="checkbox"/> Other (Specify) |
| <input type="checkbox"/> Financial Plan | <input type="checkbox"/> PID/T | _____ |
| <input type="checkbox"/> Logical Framework | <input type="checkbox"/> PID/C | <input type="checkbox"/> Other (Specify) |
| <input type="checkbox"/> Project Agreement | <input type="checkbox"/> PID/P | _____ |

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. Continue Project Without Change
B. Change Project Design and/or
C. Change Implementation Plan
D. Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AND APPROPRIATE AGENCIES INVOLVED

See attachment for Participants.

12. Mission/AID/W Office Director Approval

Signature: *(Handwritten Signature)*
Typed Name: Thomas C. Niblock, Director

Date: June 15, 1979

(Handwritten number 48)

**LIST OF PARTICIPANTS ATTENDING THE JUNE 13, 1979
USAID EVALUATION OF THE RURAL ELECTRIFICATION I**

1. Indonesian Government Representatives

a. Junior Minister for Cooperatives

1. Ir. Sjoufjan Awal, S.A. to the State Minister for Cooperatives.

b. Ministry of Finance

2. Drs. Djamhar Somaatmadja, Directorate General of Foreign Moneter Staff.

c. Directorate General of Energy

3. Ir. F. Tambunan, Chief of Sub-directorate for Power Usage.

d. Directorate General of Cooperatives

4. Drs. Mamiet Marjono, Director for Coops Business Affairs.

e. Project Development Office

5. Mr. Abdul Djapar Pringgohandoko, Acting Head of PDO.
6. Col. Sugiyartono, Special Staff to Head of PDO.
7. Ir. Adi Muhardi, Chief of Technical Division.
8. Mr. Surono, Chief of Administration.
9. Drs. A. Markam, Special Staff to Head of PDO.
10. Mr. Ismail, Chief of Secretariate Division.
11. Ir. Masfedjar, Chief of Materials Section.
12. Mrs. Indrarty Buchari, S.H., Secretariate Section Chief.

f. State Power Company, PLN

13. Ir. Margono Halimoen, Foreign Aid.
14. Ir. Sambodho Sumani, Chief of Technical Division for R.E.
15. Mr. Soewarno, Foreign Aid
16. Ir. Yuzwar, Deputy Chief Construction, P.I. Ring Central Java.
17. Ir. Soemarto Soedirman, Chief of Operation and Maintenance for R.E.

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g. Bank Indonesia

18. Mr. Socwadi, Foreign Aid Staff.

h. Bank Rakyat Indonesia

19. Mr. Iljas Hanafi, Foreign Aid Staff.

II. Canadian Government Representatives

20. Mr. Howard R. Balloch, Second Secretary,
Canadian Embassy.

21. Mr. D.E. Chaplin, First Secretary for Canadian
International Development Agency (CIDA).

III. USAID/Jakarta

- 22. Mr. Thomas C. Niblock, Director.
- 23. Mr. Raymond Cohen, Acting Deputy Director.
- 24. Mr. Richard Johnson, Program Economist.
- 25. Mr. Robert F. Zimmerman, Evaluation Officer.
- 26. Mr. David W. Devin, R.E. Project Officer.
- 27. Mr. Robert E. Davis, Acting Chief Engineer.
- 28. Mr. Benjamin Hawley, IDI.
- 29. Mrs. Mary Lewellen, IDI.
- 30. Mr. Douglas Murphy, Summer Student.
- 31. Mrs. Lanna W. Lubis, R.E. Admin. Assistant.
- 32. Mr. Fdi Setianto, Electrical Engineer.
- 33. Mr. Jack Wright, Electrical Engineer.

IV. Consultants

a. N.R.E.C.A.

- 34. Mr. Dennis Wilson, Team Leader.
- 35. Mr. Paul O. Swanson, R.E. Specialist.
- 36. Mr. Sam T. Adkins, Central Java Management
Consultant.
- 37. Mr. Roy Shoff, Training Officer.

b. Chas. T. Main International, Inc.

- 38. Mr. Howard Johnson, Acting Projects Director.
- 39. Mr. Raymond N. Key, Business Manager.

RURAL ELECTRIFICATION I - PES
AID LOAN 497-T-052
AID GRANT 497-0267

13. SUMMARY - The project involves constructing and placing in operation ten separate rural electric distribution systems, seven in Central Java and three in the outer islands. These ten service areas have a population of over two million people who compose about 400,000 families living in over 640 small and very rural villages, now totally without electricity except for a scattered few, small, private generators of 50 KW or less. The project is intended to provide electricity to at least 50% of the people in these villages at a price they can afford, to assist them in wiring their homes, and to promote the use of electricity in productive enterprises. The project expects to demonstrate that electricity can be provided to the rural areas of Indonesia at a price which the majority of the people can afford through unit systems that are technically sound and financially viable and that the introduction of electricity to the selected areas will bring about a significant increase in production and employment opportunities and improve the quality of life of the rural poor. Another purpose is to train a sufficient cadre of Indonesian experts in all phases of rural electrification so as to manage and expand the program.

The project is a multidonor effort with the Canadian Government (CIDA) financing the generation plants for the three outer island projects and the Royal Netherlands Government (Dutch) financing part of the distribution wiring for the seven Central Java Systems. The project financing is as follows:

<u>Country</u>	<u>Amount</u>	<u>Date Signed</u>
USAID Grant	US\$ 6 million	March 30, 1978
USAID Loan	US\$30 million	May 6, 1978
CIDA Grant	US\$ 1.8 million	November 16, 1973
CIDA Loan	US\$21 million	October 13, 1976
Dutch Loan	US\$ 5 million	March 21, 1979
GOI	US\$30 million	Same as above
Total	US\$93.3 million	

The seven Central Java Systems are being constructed by the State Power Company (PLN) which will also operate and maintain the completed systems. The three outer island systems are

being administered by the Directorate General of Cooperatives (DGC). The DGC will assist three private cooperatives to design, construct, and operate their own rural electric systems.

The first year of the project achieved considerable progress in laying the foundations which should result in smooth implementation in future years. Both PLN and the DGC have increased their staffs, and the DGC has established a special Project Development Office (PDO) to implement the project. About 68 Indonesian Officials were sent for orientation tours of the highly successful Philippine Program, 39 from PLN and 29 from DGC/PDO and local government. USAID, with the advice and approval of PLN and DGC, selected C.T. Main as its consultant for design and construction supervision, and the NRECA for organization, management, operation, maintenance and training assistance. Contracts were negotiated and signed with these consulting firms and some 17 long term consultants have arrived in Indonesia with their families and have begun work. These contracts are being financed by the USAID Grant Agreement.

Both PLN and DGC/PDO have prepared detailed project implementation plans covering organization, construction activities, training, and productive uses. Both PLN and DGC have submitted to USAID a schedule for the long term evaluation of the project. Preliminary arrangements for conducting this evaluation have been made by PLN, DGC, USAID and the US Bureau of Census. In addition, USAID consultants are working with PLN, DGC/PDO, and the Bandung Institute of Technology on an Environmental Assessment of the project.

PLN and USAID have agreed on the tariff structure to be used at least initially on the PLN demonstration project.

PLN using its own "off the shelf" materials has constructed a demonstration project in three villages in Klaten, Central Java. As of June 1, 1979 they had connected up over 600 houses. It is expected that within another 45 days over 1750 families, representing 70% of the residents of these villages, will enjoy the benefits of electricity in their homes and a productive uses program will be initiated. The DGC/PDO is also planning a demonstration project in East Lombok which should be energized by December 1979.

The DGC/PDO has organized and granted charters to its three outer island cooperatives. These cooperatives have elected Boards of Directors and Auditing Committees, approved by-laws, and hired temporary managers and other key staff. Financial

arrangements are being finalized between the Ministry of Finance, Bank Indonesia, Bank Rakyat Indonesia and the DGC/PDO to provide loans to these coops for the construction and operation of these systems. The DGC has bought suitable land at each site for headquarters complexes and have begun building housing for the consultants in Luwu. They are also paying staff salaries until the loans for operation and construction are signed with the Bank Rakyat Indonesia.

PLN has also selected their headquarters sites. C.T. Main is working with both agencies in the mapping, staking and design of the distribution systems as well as on the design of the headquarters complexes. The first procurement documents (IFBs) for PLN's tools and construction equipment and the DGC/PDO poles have been prepared and the other IFBs are in process.

14. EVALUATION METHODOLOGY - This is the first evaluation of this project. It is based upon recent field trips to the sub-project sites, on discussions with GOI counterparts in PLN, DGC/PDO, other GOI national, provincial and local officials, expatriate consultants from NRECA and C.T. Main, other donor personnel and USAID staff.

15. EXTERNAL FACTORS - None at this time

16. INPUTS - The inputs of the project consist of funding from the GOI, AID, the Canadian and Dutch governments, technical assistance, and training.

(a) Funding - The AID, CIDA and Dutch Grants and Loans were negotiated and signed with the GOI. \$476,000 of the AID Grant have already been disbursed for technical assistance and training. The GOI has also expended approximately Rp.247,000,000 for DGC and Rp.1,457,000,000 for PLN. The PLN budget for IFY 78/79 was sufficient to mobilized and keep the seven subprojects in Central Java moving ahead approximately on schedule. The DGC budget for IFY 78/79 was inadequate, resulting in serious delays in the start up of the three outer island subprojects. Reasons for this budget shortfall include (i) the use of inadequate estimates for support of technical assistance supplied by USAID, (ii) overly conservative estimates of the technical requirements for the DGC/PDO staff, in particular office space and travel requirements, and (iii) budget revisions by BAPFENAS because of low standards set for salaries, office space staff housing, vehicles, maintenance, and the expectation that the DGC/PDO would not spend all the funds allotted.

(b) Technical Assistance - A three-year contract was signed on August 23, 1978 with the National Rural Electric Cooperative Association (NRECA) to provide 298 man-months of consulting services in the organization, operation, maintenance of the distribution systems, and training. Another three-year contract was signed on September 18, 1978, with Charles T. Main International (CT Main) to provide 467 man-months of consulting services for the design and construction supervision of the distribution systems and headquarters complexes. Because C.T. Main already had a six-man team in-country finishing another contract with PLN, mobilization was not required. They were able to quickly begin work on the mapping, staking, and design of the systems for PLN which was able to provide full financial, logistical, and technical support. On the three outer island subprojects, C.T. Main has encountered considerable difficulties not only because of the budgetary constraints mentioned above and the remoteness of the project areas but also because C.T. Main expected that the DGC would provide them with 330 man months of technical support from a local subcontractor. A subcontractor could not be agreed upon, and USAID is no longer encouraging the DGC/PDO to find one. Instead, plans are now underway to increase both PDO's and C.T. Main's engineering staffs and to do the job by force account. C.T. Main now has a ten-man permanent team in-country and will eventually employ sixteen expatriates.

The NRECA took a little longer to mobilize. They had one consultant in-country at the time of contract signing, and the team leader arrived in November 1978. By March of 1979 the staff had increased to six long-term consultants and one short-termer. The contract calls for seven long-term consultants, though this number may be increased to ten. To date, they have assisted DGC in the organization of the Coops, the writing of job descriptions, and by-laws. They have also assisted both DGC and PLN in the preparation of Implementation plans and in the establishment of demonstration projects in the three villages in Central Java and in one village in East Lombok.

(c) The CIDA Grant provides for 325 person-months of technical assistance for the design and construction of the generation plants for the three outer islands, as well as training in their operation and maintenance. A contract has been negotiated and signed with Sandwell and Company of Vancouver B.C. for these services, and the advance team is expected to arrive in late June 1979.

(d) Training - Training plans were prepared by both PLN and the PDO with the assistance of the NRECA Training Consultant as part of the overall implementation plan. Over the next three years PLN plans to train 758 people in 22 in-country training courses and 71 people in the US and in the Philippines. Likewise, in the same time period the DGC/PDO plans to train 350 people through 30 in-country training courses and 32 people in the US and in the Philippines. Estimates are that this training program will cost approximately \$920 thousand instead of the \$600 thousand provided for in the USAID Grant and Loan Agreements. The reason for this increase is that both the numbers of people to be trained and the numbers and type of training courses has been significantly expanded over the estimate made in the project paper. For example, the PP estimated that 300 Coop and only 140 total PLN staff would receive training. Both the GOI and USAID agree on the importance of this training to project success and funds are being sought by both parties to provide this training.

Under separate contracts AID has also provided 4 months of consulting services of a productive uses planner and 4 months of an expert to conduct an Environmental Assessment (EA). Many of the ideas taken from the report of the Productive Uses Planner have been incorporated into the Implementation Plans of both PLN and the DGC. The EA is still underway.

17. OUTPUTS

(a) Plans, Specifications and Procurement Documentation (IFBs)

The implementation plans prepared by PLN and DGC/PDO are very comprehensive plans and among the best USAID has ever received on any project. While flexible, they describe in considerable detail how the subprojects will be organized, constructed, the training plan and a plan for stimulating productive uses of the electricity. Both agencies are to be commended for the high quality of these plans.

Mapping and staking of two of the outer island sites and six of the seven Central Java sites is underway. To date 2076 kilometers of three-phase primary feeders and associated single phase and primary taps have been staked and 394 field staking sheets have been prepared in Central Java. Likewise 176 kilometers of lines have been staked and 15 field staking sheets have been prepared for the outer island subprojects. This represents 71% of the estimated total for Central Java and 23% for the two outer island subprojects started thus far.

PLN's IFB's for tools and construction equipment has been finalized and only awaits the signing of a subloan agreement between PLN and the Ministry of Finance before issuance. The IFB for local procurement of poles for the cooperatives is likewise prepared and has been submitted to the DGC/PDO and USAID for review. PLN will prepare their own IFB's for poles. The Dutch procurement documents for PLN's conductor are in final stages of preparation. The hardware IFB's for both PLN and DGC are being prepared and it is expected that all IFB's will be issued by August 1979.

(b) Headquarters Facilities - The DGC has bought the necessary land in Luwu and Lampung and 1.75 hectares in Lombok. The remaining 4.25 hectares in Lombok will be purchased in the near future as soon as DGC receives its annual budget allotment. PLN has selected centrally located sites at each of the seven areas in Central Java and only await the approval of their IFY 79/80 budget to purchase them. C.T. Main is working on the design of the outer island complexes and will assist PLN in their design as well as perform construction supervision for all ten sites.

(c) Operating Electric Distribution Systems - PLN has lent its own materials to the project and has constructed and placed in operation a demonstration R.E. project covering the first three villages leading out from the Klaten substation in Central Java. This has involved construction of 17 Km of three phase and single phase lines, 26 Km of Secondary underbuild, setting 483 poles, 32 transformers and the wiring to date of over 600 houses. Within the next 45 days, it is expected that 70% of the 2500 homes in these three villages will be enjoying the benefits of electricity. PLN also plans to promote the community and productive uses of electricity in these three villages. Although project materials were not used for this effort, technical assistance has been provided, and construction has followed as closely as possible system design for the over-all project. PLN will be reimbursed for their materials when the project materials arrive. It is expected that this demonstration effort will show among other things that the rural poor of Central Java want and can afford electricity. The U.S. Bureau of Census team has visited the three villages and plans are underway for a mini-evaluation of its immediate impact for use in developing the R.E. II Project Paper.

(d) Internal Housewiring - Both PLN and DGC have developed basic designs and material specifications for housewiring with assistance from the consulting teams. IFBs for procurement of materials are now being prepared. As mentioned above over 600 houses in the Klaten demonstration effort have been already wired by PLN. They have 40 people employed for this purpose.

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(e) Training Courses Completed and Trained Personnel
 In-country training courses have been held for PDO staff, the Coop Boards of Directors, the Auditing Committees, temporary managers, and other local government officials associated with the outer island projects. A total of 749 Indonesians including local government officials and informal village leaders received in-country orientation training in support of the outer island subprojects. In addition 68 Indonesians have been sent for orientation tours of the highly successful Philippine Program in the past year. This includes 39 PLN officials and 29 DGC/PDO staff and local government officials.

(f) Billing and Collection System - A short-term consultant from NRECA worked with PLN and the DGC for about six weeks in the design of an accounting system for the project. The NRECA has also made recommendations for billing and collecting, but implementation will have to await energization of the systems. The billing and collection systems in the demonstration project is the same as PLN's present system for urban customers in Central Java and is being handled by personnel from the Klaten PLN sub-branch office.

(g) Evaluation Feedback - Staff from the U.S. Bureau of the Census (BUCEN) which assisted the NEA conduct the evaluation of the Philippine Program has visited Indonesia twice in the past six months, and preliminary arrangements have been made with PLN and DGC to conduct a similar evaluation of the Indonesian R.E. Program over the next five years. This evaluation will be the responsibility of PLN and DGC which have agreed to assign staff as required to this effort. The U.S. BUCEN personnel will train and assist PLN and DGC to conduct the evaluation.

18. PURPOSE - The purpose of this project is to demonstrate that electricity can be provided to the rural areas of Indonesia at a price which the majority of the people can afford through systems which are technically sound and financially viable and that the introduction of electricity to the selected areas will bring about a significant increase in production and improve the quality of life of the rural poor. Another purpose is to train a sufficient cadre of Indonesian experts in all phases of rural electrification so as to manage and expand the program.

While it is too early to evaluate the project purpose, USAID remains optimistic that by 1983 the End of Project Status as described below will be achieved.

(1) Seven rural areas in Central Java including over 400 villages will be provided with reasonably priced, reliable electric power 24 hours a day from the PLN grid. These areas

have a combined population of over 1.3 million people including approximately 260,000 families. It is expected that at least 50% of these people will enjoy the benefits of electricity in their homes and nearly all the people living in these areas will benefit through street lighting, the lighting of schools and other public buildings, the increased use of refrigeration and ice in markets and restaurants, the use of irrigation pumps, potable water pumps and other productive usages.

(2) Three rural areas in the Outer Island districts of Central Lampung, East Lombok and Luwu including almost 200 villages will be provided with reasonably priced, reliable electric power 24 hours a day by member-owned and managed electric cooperatives. Likewise the combined population of these areas is over 650,000 including approximately 130,000 families and it is expected that at least 50% of them will be connected to the system. All the other people in the area will benefit in much the same manner as described above for the Central Java systems.

(3) A three-phase backbone system expandable to serve additional residents in all these areas.

(4) An active power usage program at each of the ten areas which is working with local leaders and private individuals to promote a whole host of productive power use projects and enterprises.

(5) The existence at each site of a three to four hectare headquarters site (six or ten Ha in the outer islands) complete with office space, warehouse, storage yard, maintenance facilities and as necessary staff housing.

(6) Each system will have a fully trained and functioning management and operating staff to operate, maintain and expand their service.

(7) Both PLN and the DGC will be fully capable of organizing financing, designing, procuring materials for, supervising construction and initial operation of rural electric systems.

(8) The Project will have been continually evaluated during implementation and the first three years of operation by a local research contractor working under the direction of PLN and the DGC. This evaluation will provide a continuous flow of feedback information to the GOI and USAID project managers and will indicate the linkages between project purpose and the sector goal.

19. PROGRAM OR SECTOR GOAL - The goal of this Project is to improve the standard of living and increase productivity of the rural population in ten selected areas of Indonesia.

Again while it is too early to evaluate this goal, USAID is optimistic that the provision of electric power to these areas should bring a new dimension to the package of existing rural development programs that together will improve productivity and employment opportunities as well as raise the quality of life for the people who live in the target areas.

There is a very large number and variety of potential productive uses of electricity in these ten rural areas, most of which could benefit the poor and the very poor. A partial list would include rice and other grain mills, irrigation, poultry farms, sugar processing, copra, tobacco and other food processing, refrigeration in shops, sawmills and box factories, rattan furniture and other woodworking shops, hollow blocks, floor and roof tiles and pottery factories, blacksmith, machinery and repair shops, food, pharmacy and general merchandise stores. Many of these activities already exist in the target areas using substitute forms of power. However, in other countries the extension of electricity to the rural areas caused significant increases in the number of new activities as well as increased output from existing farm, commercial and agro-industrial enterprises. There is strong reason to believe that this will also occur in Indonesia.

In addition to stimulating production in the selected areas, the introduction of electric power into these rural areas should generate considerable employment thus making a contribution to one of Indonesia's more intractable problems. For example, one Co-op in the Philippines reports that in the four years since energization twenty-five new business enterprises have been established creating a total of 430 new jobs. This does not count additional employment generated at the existing firms or home industry, e.g., handicrafts. Also each system will employ over 100 people in management, operation and maintenance. Extrapolating from this example we estimate that the ten utilities planned to be established in this proposed project should create at least 5,000 new jobs in small to medium scale industry plus untold thousands of new employment opportunities for home and handicraft industries. The project may also demonstrate that further indirect benefits to rural residents will occur through the impact of electricity on such things as potable water supply, quality of health services, availability of education and training, and the nature and quality of government services.

20. BENEFICIARIES* - The numbers of target villages and households at the proposed project sites are given below:

*/ Also see attachment

Site	No. of Target Villages	Pop. of Target Villages	No. of Target Households*	Est. Target Pop.	Village Pop. Density**
A. Central Java					
Pek-Pem.	102	242,120	20,000	102,000	1141
Klaten	98	245,105	25,000	120,000	2003
Bant.-Sleman	21	169,964	20,000	84,000	1403
Sragen	47	139,278	15,000	70,000	1132
Magelang	83	175,630	20,000	100,000	1002
Wonogiri	54	167,081	15,000	81,000	872
Banyumas	35	145,301	15,000	75,000	791
B. Outer Isl.					
Luwu	65	132,263	15,000	85,000	34
Lampung	108	272,505	25,000	150,000	590
Lombok	34	262,312	25,000	115,000	828
TOTALS	647	1,952,559	195,000	983,000	-

* Based upon assumption that 50% of households would connect to the system, an assumption which was made for planning purposes and which has since been confirmed to be within reason by various social/economic surveys.

** Based on average household size at each site.

*** No. of persons per sq. Km of village land.

Thus a total of 195,000 households (composed of, as shown above, an estimated 983,000 people) in 647 initial target villages will immediately and directly benefit from the project spread effects (through street lighting, the lighting of educational and public buildings, potable water pumps, increased jobs and productivity resulting from more activity in the formal and informal economic sectors, etc.). The project will almost immediately benefit the remaining 1,000,000 people of the target villages even if their households are not electrified. The cost of the project (\$93.8 million) should be less than \$100 per primary beneficiary and less than \$50 per secondary beneficiary.

Tabulations of the data gathered by the 1977 survey of these areas show the following classification of the proposed beneficiaries by primary occupation of the heads of households:

<u>Primary occupation of household head</u>	<u>No. of house- hold heads</u>	<u>%</u>
Farmer	44,743	60.0
Wage laborer	18,200	24.4
Salaried	6,454	8.6
Tradesman	4,078	5.5
Cash crop farmer	1,122	1.5
TOTALS	74,597	100.0

From the above table it can be seen that the proposed direct beneficiaries will be the rural poor; the small farmer, the daily wage laborer and the small entrepreneur. Together, they total some 90% of the 74,597 sample households.

From further analysis of the survey data it can be stated that:

(a) The vast majority of the farmers in these areas (37,045 or 82.3% of farmers) cultivate less than one hectare of land; this is at or below the national average holding of 0.98 ha. In general, especially in Java, the land holdings of the cash crop farmers conform to this pattern. Because of this, they are forced into secondary, tertiary and even quaternary occupations to sustain a livelihood so that the line between small farmers and daily wage laborers is hard to delineate. Wage laborers rarely earn over Rp.500 (\$1.20) a day; more usual is half that sum.

(b) Tradesmen are also generally engaged in small-scale enterprises. Of 4,078 tradesmen, 3,499 (86.0% of tradesmen) have a maximum of two employees.

(c) Salaried and professional people, including civil servants, amount to 8.6% of the total sample households and usually constitute the village elite.

(d) Transmigrants (i.e., settlers in newly-opened lands in islands outside of Java) are the predominant potential direct beneficiaries in Lampung and, to a lesser extent, in Luwu. In the latter site, however, many of the possible beneficiaries have never had the opportunity for participation in the national life of the country. The provision of electricity will aid considerably their efforts in this direction.

21. EFFECT TODATE - The project has already caused a great deal of discussion and debate among policy makers within the GOI. They well understand the linkage between RE and Rural Development and have attached priority to the project. These discussions have resulted in the lowering of the burden to consumers, by extending credit for connection and construction costs, the trail use of kilowatt hour meters for small consumers, and the acceptance of rural electric coops, at least on a trial basis, as a complementary institutional vehicle for rural electrification. It is expected that the project will eventually convince the GOI leadership that the model being demonstrated is replicable, appropriate and can be used to electrify the entire country in a financially sound manner.

22. LESSONS LEARNED

1. USAID is learning that its consultants will be mobilized more rapidly and work more effectively when the GOI is relieved of the burden of logistical support requirements. USAID took a significant step in this regard by providing housing for Jakarta - based and Lampung, Lombok consultants and some of their vehicles.

2. In planning future projects more precise attention should be given to defining the duties and responsibilities of the consultants as well as their working relationships with their counterparts.

3. More lead time should be allowed for mobilization of the consulting teams and for the provision of local support. A possible solution for alleviating some of the start-up difficulties in the future loans would be to provide for a small draw-down on project loan funds for this purpose prior to satisfaction of all conditions precedent to disbursement for major procurement.

4. Every attempt should be made to reduce to the maximum necessary the number of conditions attached to the loan agreement.

5. USAID should ensure that it has adequate personnel to backstop a project of this magnitude.

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PROJECT TITLE: Rural Electrification

1. Impact re Section 102(d) Criteria: (Explain How)

Increase Agricultural Productivity

Electrification should enable farmers, either individually or cooperatively to establish electrically powered irrigation pumps for areas where alternative irrigation systems are not physically or economically feasible. This should lead to more extensive and intensive land utilization and a shift

(Cont'd)

Reduce Infant Mortality

Electrification should stimulate improvements in medical and health care and in environmental sanitation through the establishment of local electric-powered water supply systems and the increased investment by rural health clinics and maternity centers in electrical equipment such as sterilizers, refrigerators, x-ray machines, operating lamps, etc.

Control Population Growth

Electrification should increase standards of living and quality of life that will generate changes in the consumption and investment patterns and aspirations of the rural households. These factors will raise the opportunity costs of additional children thus creating pressures for limiting further child-bearing. Reinforcing the shifts in the economics of fertility,

(Cont'd)

Promote Greater Income Distribution

Electrification should generate increase incomes of the rural poor and increase participation in the labor force by women and the poorest of the poor. Higher incomes should result from increased production from irrigation new farm inputs, or additional land brought under cultivation, increased employment in new or expanded enterprises and higher prices (Cont'd)

Reduce Un-Utilized Land

Electrification should generate new small-scale business enterprises and stimulate existing firms. It should also help attract medium and large scale industrial enterprises to establish in rural areas. The more intensive labor requirements of irrigated farms as well as the development of idle or unproductive land should generate significant increases in

(Cont'd)

and related criteria:

Strengthen/Create institutions which aid social/economic development

The Electrification of schools, government offices and other institutions should expand their productive use and

(Cont'd)

Improve condition of women: Social/Economic/Political

Electrification should increase female employment opportunities and incomes and improve the quality of life for women. Electrification and the increased use of machinery tends to equalize the natural strength advantage of men. Studies

(Cont'd)

CONTINUATION

Increase Agricultural Productivity

from cultivation of low-productivity (corn) to high-productivity (rice) cash crops. Farm losses should also be reduced through the use of electrified dryers, grain mills and storage facilities.

Control Population Growth

The increased social, educational and community activities of children tend to reduce the children's economic value to parents as productive agents. Also the increased incomes and greater opportunities for saving and investment should reduce the need for the traditional investment in children for old age security. Finally the increased evening hours devoted to work and other leisure activities should reduce sexual activity.

Promote Greater Income Distribution

for farm products. Increased participation for women and disadvantaged groups should result from agricultural changes, increased educational opportunities, industrial and business developments and household use of time.

Reduce Un-under Employment

agricultural employment opportunities.

Strengthen/Create Institutions Which Aid Social/Economic Development

increase the quality of their services to the communities thus generating widespread social and economic changes in the rural areas.

Improve Condition of Women: Social/Economic/Political

of electrified areas show that women engage in more productive types of works, work for longer periods during the year and have higher mean annual cash incomes than their counterparts in non-electrified areas. They also benefit from increased numbers and types of household electrical appliances.

**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

ANNEX A

Life of Project:
From FY 77 to FY 81
Total U.S. Funding: 948 million
Date Prepared: August 12, 1977

Project Title & Number: Indonesia - Rural Electrification

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal:</p> <p>The broader objective to which this project contributes:</p> <p>Improved standard of living and increased productivity of rural population in ten selected areas of Indonesia.</p>	<p>Measures of Goal Achievement:</p> <p>Some of the following are expected to be present as OVI:</p> <ol style="list-style-type: none"> 1. Electric lights replacing kerosene in homes and for street lights. 2. Markets, stores, homes, restaurants utilizing refrigeration and other appliances. 3. Small irrigation (electric pumps) projects increasing yields and allowing for multiple cropping. 4. Increased production from small industries and increased numbers of new rural industries. 5. New employment opportunities especially for women. 6. A slow down in rural migration to cities. 7. Correlation of home lighting and decrease in population growth rate. 8. Limited school and other public facilities utilized at night. 	<ol style="list-style-type: none"> 1. Cooperative, PLN and Government records, Ministry of Agriculture records, Observation, research and special evaluations. 	<p>Assumptions for achieving goal targets:</p> <ol style="list-style-type: none"> 1. Rural electrification is part of an integrated rural development program defined and adopted by the CGI which includes agriculture research, extension, family planning, credit, marketing and rural roads. 2. Government policies encourage new enterprises. 3. Moderate inflation rate. 4. Government price, tax and import policies support rural development. 5. Farmers respond to economic incentives.

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

ANNEX A
Page 2
Life of Project: From FY 77 to FY 81
Total U.S. Funding \$48 million
Date Prepared: August 12, 1977

Project Title & Number: Indonesia - Rural Electrification

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose:</p> <p>The purpose of this project is to demonstrate that reliable electric power can be provided to the rural areas of Indonesia at a price which the majority of the people can afford through systems which are technically sound and financially viable and that the introduction of electricity to the selected areas will bring about a significant increase in production and improve the quality of life of the rural poor. A subsidiary purpose is to train a sufficient cadre of Indonesian experts in all phases of rural electrification so as to manage and expand their rural electric systems.</p>	<p>End of Project status:</p> <ol style="list-style-type: none"> 1. At least 50% of a combined population of 1.3 million people living in over 400 villages in seven areas of Central Java will be served 24 hrs/day from the PLN grid. 2. At least 50% of a combined population of 650 thousand people living in almost 200 villages in three outer island locations will be served 24 hrs/day by member owned and managed electric coops. 3. Nearly all the people living in all ten areas will benefit through such items as are listed as OVI for Goal achievement above. 4. A three phase backbone system expandable to serve additional residents in the area. 5. An active power usage program at each of the ten areas. 6. The existence at each site of a three to four hectare headquarters site complete with office space, warehouse, storage yard, maintenance facilities and as necessary staff housing. Coops will have generators. 7. Each system will have a fully trained and functioning management and operating staff to operate, maintain and expand their service. 8. Both PLN and the DGC will be fully capable of organizing financing, designing, procuring materials for, supervising construction and initial operation of rural electric systems. 	<ol style="list-style-type: none"> 1. GOI reports. 2. Field visitation and system inspection. 	<p>Assumptions for achieving purpose:</p> <ol style="list-style-type: none"> 1. The central government will continue its commitment to the project and provide the necessary local support including funds, charters for the coops and other policy guidance. 2. That PLN will be able to reduce its construction costs and connection charges so that at least 50% of the people living in the target areas will be able to afford the service. 3. That financial arrangements will be made to pass on the AID loan terms to the local systems so as to make them financially viable. 4. That sufficient manpower will be made available capable of being trained for the jobs requiring technical skills.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: ANNEX A
From FY 77 to FY 81 Page 3
Total U.S. Funding \$48 million
Date Prepared: August 12, 1977

Project Title & Number: Indonesia - Rural Electrification

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Outputs:</p> <ol style="list-style-type: none"> 1. Detailed designs and material specifications. 2. Headquarter sites including office space, warehouse, storage yard maintenance, staff housing and for the outer island coops, generation plants. 3. Operating electric distribution system. 4. Internal housewiring including light fixtures, switches and convenience outlets. 5. Billing and collection system. 6. Training seminars and courses. 7. Train personnel. 8. Evaluation feedback. 	<p>Magnitude of Outputs:</p> <ol style="list-style-type: none"> 1. Designs and specification for 10 systems, 7 in Central Java and 3 on the outer islands. 2. 10 headquarter sites of which 3 will have generation plants. 3. The ten systems will require an estimated 4,000 Km of primary and secondary lines, 2,400 Km of secondary underbuild 60,000 poles, 2,500 transformers and 200,000 KWH meters. 4. By PACD it is estimated that 195,000 consumers will have been provided with housewiring. A minimum package will consist of three light fixtures, three switches and one convenience outlet. 5. Approximately 35 courses and seminars. 6. Over 500 people trained including at least 100 at each coop, 20 at each PLN area and 60 project management staff from PLN, DCC, BAPPENAS and BRI. 7. One billing and collection system for the PLN utilities and a comparable system for each coop. 8. One baseline survey plus 4 annual surveys. 	<ol style="list-style-type: none"> 1. Reports completed. 2. NRECA, USAID, GOI records. 	<p>Assumptions for achieving outputs:</p> <ol style="list-style-type: none"> 1. The NRECA team with the help of PLN and the DCC staff will complete the feasibility studies for all systems. 2. The GOI will meet the CP's. 3. Contracts will be signed with the NRECA/NEA team and the Consultant. 4. Participant trainees will be made available. 5. Counterpart funds will be made available on a timely basis. 6. The materials will arrive on time, in good order and be properly distributed. 7. PLN and local contractors can construct the systems.

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RURAL ELECTRIFICATION I-PLN IMPLEMENTATION PLAN

1978.	1979	1980	1981	1982	1984
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Legend

● Construction

● Documentation, Organization

● Training

● Productive Uses

● Environment, Impact Study, Evaluation

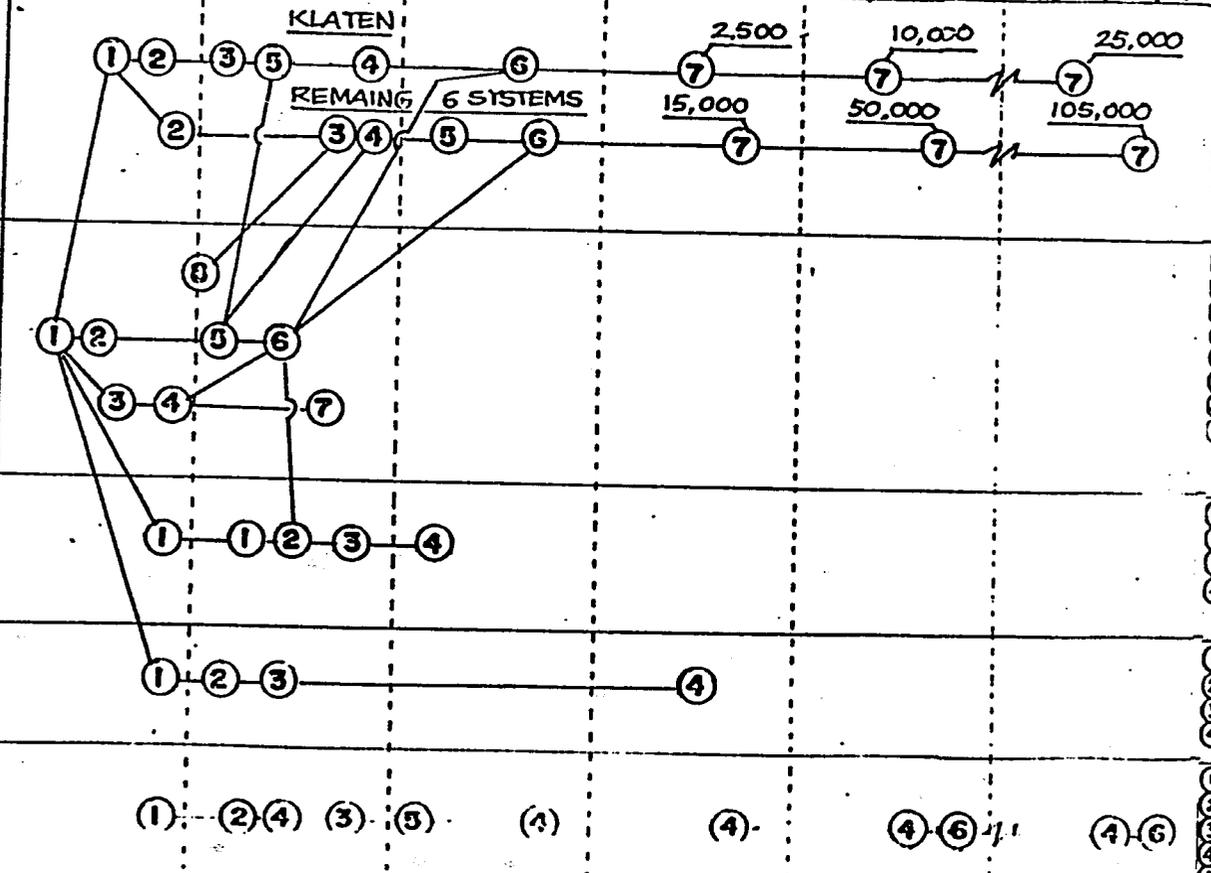
- ① A/E CONTRACT SIGNED
- ② A/E STARTS DESIGN WORK
- ③ START SYSTEMS CONSTRUCTION
- ④ START HEADQUARTERS CONSTRUCTION
- ⑤ FIRST VILLAGE ENERGIZED
- ⑥ COMPLETE HEADQUARTERS
- ⑦ CUSTOMER CONNECTIONS,

- ① GRANT AGREEMENT SIGNED
- ② LOAN AGREEMENT SIGNED
- ③ NRECA CONTRACT SIGNED
- ④ NRECA-PLN ADVISOR - SEMARANG
- ⑤ CONDITIONS PRECEDENT MET
- ⑥ APPOINT MGRS & KEY STAFF
- ⑦ SEP UP COST ACCOUNTING - NRECA
- ⑧ DUTCH LOAN AGREEMENT SIGNED

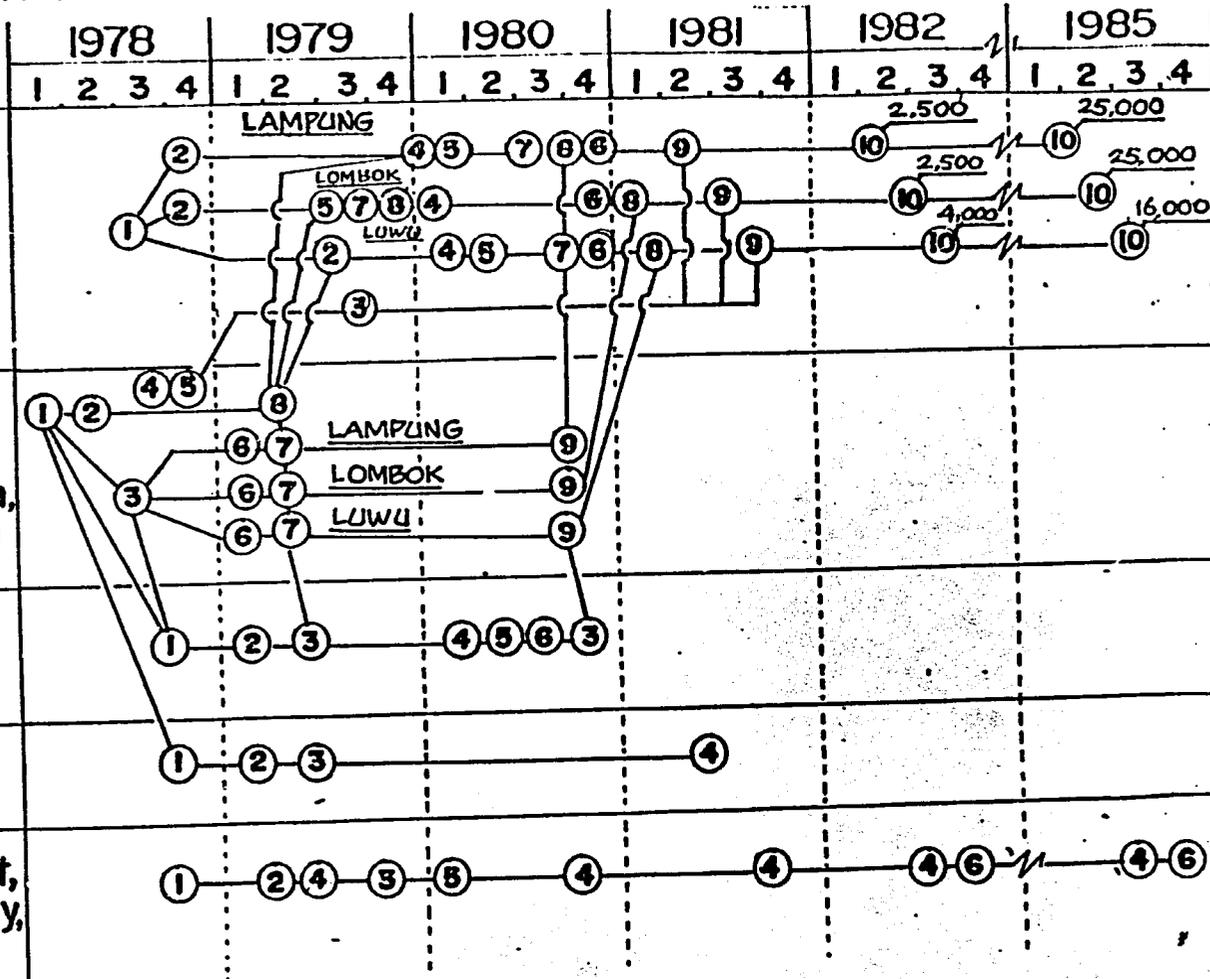
- ① TRAINING & ORIENTATION PHILIPPINES
- ② KEY STAFF TRAINING - PHILIPPINES
- ③ LINEMAN
- ④ HOUSEWIRING

- ① PRODUCTIVE USES CONTRACT SIGNED
- ② SCOPE OF WORK & PROG. APPROVED
- ③ TEAM STARTS WORK
- ④ TEAM COMPLETES WORK

- ① ORGANIZE DATA TESTING TEAM
- ② TEST MIN. OF INTERIOR DATA
- ③ ENVIRONMENTAL ASSESSMENT
- ④ PROJECT EVALUATION
- ⑤ BASELINE DATA STUDY
- ⑥ IMPACT STUDY



RURAL ELECTRIFICATION I DGC IMPLEMENTATION PLAN



Legend

- ① A/E CONTRACT SIGNED
 - ② A/E START DESIGN WORK
 - ③ CIDA CONSULTANT STARTS DESIGN
 - ④ START HEADQUARTERS CONSTRUCTION
 - ⑤ START SYSTEMS CONSTRUCTION
 - ⑥ COMPLETE HEADQUARTER CONSTRUCTION
 - ⑦ INTERIM GENERATORS INSTALLED
 - ⑧ FIRST VILLAGE ENERGIZED
 - ⑨ CANADIAN GENERATORS INSTALLED
 - ⑩ CUSTOMER CONNECTIONS
-
- ① GRANT AGREEMENT SIGNED
 - ② LOAN AGREEMENT SIGNED
 - ③ NRECA CONTRACT SIGNED
 - ④ CIDA LOAN FOR GENERATORS SIGNED
 - ⑤ CIDA GRANT SIGNED
 - ⑥ START ORGANIZING COOPS
 - ⑦ INTERIM BOARD APPOINTED
 - ⑧ CONDITIONS PRECEDENT MET
 - ⑨ PERMANENT COOP BOARD ELECTED
-
- ① PDO ADMINISTRATION JAKARTA
 - ② KECAMATAN OFFICIALS AT SITE
 - ③ GEN. MGR & KEY STAFF - PHILIPPINES
 - ④ ACCOUNTING STAFF - JAKARTA
 - ⑤ LINE MEN
 - ⑥ HOUSEWIRING
-
- ① PRODUCTIVE USES CONTRACT SIGNED
 - ② SCOPE OF WORK & PROGRAM APPROVED
 - ③ TEAM ARRIVE & STARTS WORK
 - ④ WORK COMPLETED
-
- ① ORGANIZE DATA TESTING TEAM
 - ② TEST MIN. OF INTERIOR DATA
 - ③ ENVIRONMENTAL ASSESSMENT
 - ④ PROJECT EVALUATION
 - ⑤ BASELINE DATA
 - ⑥ IMPACT STUDY

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SUBJECT: PDP INSTITUTION-BUILDING CONSULTANCY, PROJECT

0264 AND 076

RE: (A) JAKARTA 18265, (B) STATE 286563, (B) JAKARTA 15994

1. LOWENTHAL PLANNING ARRIVAL JAKARTA O/A JANUARY 15 AND DEPARTURE NO LATER THAN JANUARY 19. EXACT ETA WILL FOLLOW PENDING CONFIRMATION OF TDYS IN NEPAL AND THAILAND.

2. DS/RAD WILL FUND LOWENTHAL JAKARTA TDY. VANCE

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**RURAL ELECTRIFICATION:
LINKAGES AND JUSTIFICATIONS**

by
Judith Tendler

**A.I.D. Program Evaluation
Discussion Paper No. 3**

**The Studies Division
Office of Evaluation
Bureau for Program and Policy Coordination
U.S. Agency for International Development**

April 1979

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PREFACE

The A.I.D. Program Evaluation Discussion Paper Series: Office of Evaluation Approach

This is one of a series of discussion papers issued by the agency for International Development. This paper is sponsored by the Office of Evaluation.

The purpose of the A.I.D. Program Evaluation Discussion Paper Series is to stimulate thought and dialogue on development problems and to encourage experimentation. The authors of the papers are instructed to be critical in a constructive sense and to examine explicit or implicit assumptions that are usually taken as given, to look for unrecognized and often cross-sectoral linkages, to examine host country institutional factors, to examine how AID's organization, staffing and procedures affect its effectiveness, and to identify alternative approaches and policy options. Two key factors characterize the series: actual development experience is sought as a basis for opinion and opinion is directed towards policy issues. The papers are a mix of what is known (from experience and evaluation evidence) and what needs to be known from further evaluative studies.

Because the discussion papers are exploratory, they are not intended to be comprehensive in coverage, conclusive in their argument, or primarily technical in orientation. They are intended to help formulate additional hypotheses for testing and to assess what additional work needs to be done on the problem. We hope that the discussion papers will help stimulate innovative and more effective programming and project design in our overseas missions and that they will also be of interest to scholars carrying out research on development.

Most importantly, however, we hope that the papers will elicit responses from our readers--responses that will confirm or refute assertions, refine or add issues to be analyzed, and suggest case studies necessary to resolve issues.

The primary objective of the Office of Evaluation is to provide AID management with analyses of the intended and unintended impact of projects, programs, policies, and procedures. It is our intent that lessons gleaned from AID's past be made readily available to improve present planning.

The Office tailors its approach to suit the nature of a problem, its urgency, and the type of data available. After identifying a problem and ascertaining management interest in it, the Office's staff normally links up with or establishes a network of AID and non-AID experts. The staff also reviews information from the Agency's automated data base systems and assembles documents including project papers, project evaluations, and special studies sponsored by other parts of the Agency. In conjunction with this, the Office commissions discussion papers by experts who are familiar with development problems. It may also hold workshops and conferences and, if necessary, carry out field studies of past projects and programs. The Office does not sponsor basic research on development but concentrates on analyzing available information.

Findings are issued in discussion papers, workshop and conference reports, circular airgrams, action memoranda, sector and subsector studies and case studies. These do not constitute formal guidance unless they are explicitly cleared and issued as such.

About the Author

Judith Tendler has a Ph.D. in economics from Columbia University. Her doctoral dissertation--Electric Power in Brazil: Entrepreneurship in the Public Sector--was published by Harvard University Press. Dr. Tendler worked for the Agency from 1967 to 1970--first in the Brazil Mission in Rio de Janeiro, and then in the Office of Development Resources of the Latin America Bureau. During that period, she did several evaluations of electric-power, highway-construction, and highway-maintenance projects. Since leaving the Agency, Dr. Tendler has worked as a consultant for the World Bank, the Inter-American Development Bank, the Organization of American States, and the Agency--mainly in the area of agricultural and rural development projects. Dr. Tendler was a Fellow at the Center for Advanced Studies in the Behavioral Sciences at Stanford in 1973-1974, during which time she completed a book on project decisionmaking in foreign assistance organizations. Her book, Inside Foreign Aid, was published by the Johns Hopkins University Press in 1975.

Author's Note

This paper, together with a companion paper on rural roads, is based on 40 interviews conducted in Washington over the period of a month in the spring of 1978. Valuable additions to the interviews were provided by the comments of AID staffers at my preliminary presentation in May, and by the literature cited at the end of the paper.

The reader will find little citation of sources in the text. Most of the lessons to be learned from AID's projects are not written down, and come from my interviews. Out of consideration for those who talked with me, I have preferred to not cite interview sources at all. I have referred where possible to written analyses and descriptions of projects and points discussed in the text. A list of the documents collected during this period follows the text.

A draft of this paper was distributed within AID in late 1978, followed by a seminar held at AID in February of 1979. The seminar provoked lively discussion on various sides of the issues, and many valuable contributions were made to the ideas presented in the paper. In the interests of facilitating an immediate wider distribution of the paper within the Agency, and because the paper is preliminary to a series of field studies of rural-electrification projects to be undertaken by the Studies Division, I chose not to revise the paper at this point. The seminar resulted in the formation of an Agency-wide study group on rural-electrification-project evaluations, which will attempt to see that the issues raised by the paper and the seminar receive attention in subsequent project evaluations sponsored by the various bureaus of the Agency.

I am most grateful to the many persons who spent time telling their project stories in response to my questions, to those who took time to write down their reactions to my paper, and to those who attended the seminar and made it a vigorous exchange of ideas. I very much appreciated the support and the challenges provided by the Studies Division of PPC.

--Judith Tendler

Summary and Recommendations

With the new concern for the rural poor, AID's infrastructure projects have had a more difficult time gaining approval. New-Directions critics say that infrastructure projects do not have a direct impact on the rural poor, in comparison to projects in the areas of rural health, nutrition and agriculture. In contrast to these latter projects, it is said, infrastructure can not be focused exclusively on the poor. Rural electrification has been particularly affected by this new thinking, though a good number of such projects have still succeeded in overcoming the opposition.

In trying to defend rural-electrification (RE) projects against New-Directions disapproval, AID seems to have focused on aspects of such projects that do not represent their greatest potential. Namely, it has emphasized the benefits resulting from household consumption of rural electricity more than those from productive and municipal uses. The household focus dominates AID's impact studies of rural-electrification programs--partly because of the household emphasis of its most successful RE program in the Philippines, and partly because of the household orientation of its sole RE contractor, NRECA (The National Rural Electrification Cooperative Association).

✓ It is difficult to show that the introduction of rural electrification to households can have as significant an impact on the rural poor as other types of rural development projects. Either the poor do not have the resources or the houses to hook up to the system--or they use electricity only for lighting, continuing with wood for cooking and ironing. On the one hand, one can not claim a significant New-Directions impact on the rural poor on the grounds of lighting only. On the other hand, one can not classify as the rural poor those who do make more extensive use of household electricity through the purchase of appliances. Finally, the rural poor themselves do not place high value on the acquisition of household electricity. When villages without electricity are polled about their preferences, electrification is low down on the list, with highest priority given to services like health and water supply.

✓ A stronger New-Directions case for rural electrification can be made on the grounds of the potential impact on the rural poor of certain productive and municipal uses of electricity, and of procurement from local industry of materials used to build and maintain such infrastructure projects. Productive uses-- in the form of rural light industry or irrigation--generate employment for the rural poor, whose major source of income is

from off-farm earnings. Municipal uses of electricity can facilitate the supply of services such as health clinics, night education classes, or street lighting. These services are accessible to and valued by the rural poor more than household connections.

As currently designed, rural-electrification projects do not necessarily result on their own in these desirable impacts. AID should therefore direct more attention to evaluating the non-household potential of its rural-electrification projects—not to provide them with a better justification, but so as to learn how to design them in a way that assures that this potential is realized. Some possible approaches would be the following: (1) credit and/or technical assistance for rural light industry could be included in RE projects—or other features that would increase the probability that electrification would result in the establishment or expansion of employment-creating uses; (2) similarly, AID could try to increase the probability that municipal services directly benefiting the rural poor, and dependent on electricity, would be introduced with an electrification project: a health-clinic component might be put together with an RE project, or special consideration could be given for hookups and rates to municipalities that organize such efforts on their own; (3) attempts

should be made to facilitate local procurement of equipment and materials for rural-electrification projects and, indeed, for all AID-financed infrastructure projects; infrastructure projects create a large, predictable and ongoing demand for certain locally suppliable materials, and many such local supply operations are labor-intensive.

Promoting the local supply of AID's rural-electrification projects will require an overhaul of specifications for RE projects--as is now being done with road-construction specifications as part of the attempt to introduce labor-intensive methods of construction. The effort will also require that AID enlist the assistance of those who have a vested interest that such local supply take place--local associations of manufacturers, ministries of industry and commerce, local labor unions, etc. For the AID mission, in contrast, local-supply arrangements are undesirable in that they mean an increased expenditure of scarce project-preparation time. In order to keep this burden off the mission, and to create a vested interest for local supply within AID itself, AID should create an office of "backward linkage" to supervise the search for local-supply possibilities. By neglecting the backward-linkage aspect of its RE and other infrastructure projects, AID may be giving up the greatest opportunity that such projects offer for New-Directions impacts.

All the above suggestions will require a questioning of the standard way in which AID's rural-electrification projects are designed and implemented. Modifications of design and specifications will be required that maximize the employment-creating uses of rural electricity and the employment-creating local procurement for RE projects. Up to now, RE project design has not been subject to this kind of scrutiny, in contrast to the case of road-construction technology. The desired modifications of RE project design, of course, will be different from those in roads, for electrification concern will be focused more on employment-creating uses of the infrastructure facility than on employment-creating techniques of construction. But the two are similar in that they both merit the promotion by AID of employment-creating supply of construction and maintenance materials.

AID may in some cases be introducing large rural-electrification projects into areas where electrification, or central systems, are not yet economically justified. Up to now, AID's justifications of rural electrification simply assume that electricity is more efficient than existing forms of energy use (wood, kerosene, batteries, etc.)--and that central-station systems are more economic than existing diesel generators (autogeneration). AID usually says, for example, that one of the important economic benefits of the

introduction of rural electricity is the replacement of kerosene use in household lighting: electricity is cheaper than kerosene, causes less pollution, and reduces the demand for petroleum derivatives. This is a quite partial reckoning of costs and benefits. ✓ The saved cost of kerosene in household lighting needs to be compared to the increased use of petroleum derivatives that results from the new power-generating plants and from consumption uses that are complementary with the increased use of electricity.

Similarly incomplete benefits are cited with respect to the substitution of electricity for wood as a source of energy in the household. This substitution is said to help prevent deforestation. AID studies actually show, however, that even those poor who hook up to the system continue to use wood for cooking and ironing. ✓ This suggests that electricity is not competitive with wood--at least for the poorest--and does not therefore lead to the alleged conservation benefit.

✓ Central-station systems should also not be assumed to be always more efficient than autogeneration. The introduction of rural electricity through independent diesel generators--or the continuation of an existing autogenerated supply--would in various cases be more efficient than the introduction of central-system supply. In contrast to autogenerator units, central-station

systems require difficult management skills that are scarce in developing countries, especially for the state power authorities now usually in charge of electrification. The integration of power supply in central-station systems--said to be one source of their efficiency--can upon closer examination be seen to have a significant disadvantage: central systems spread the results of breakdowns to more consumers and over more systems than in the case of a set of independent autogenerators covering the same number of municipalities. Because these breakdowns, and the faulty maintenance practices that contribute to them, are common in developing countries, the breakdown-magnifying impact of central systems introduces a significant economic cost not present in the more primitive, unconnected generators.

Growth through autogenerators allows a more divisible investment in electric power--often more suitable to the capital scarcities of developing countries and the uncertainties about how and where demand will grow. Growth of rural electricity through autogeneration can also elicit local organization and financial participation in a way that central-system growth does not. Unfortunately, the biggest argument against autogeneration is that it is easier for AID to finance a big capital project than lots of little ones. The evaluation suggests some ways in which this problem might be overcome, and how AID might finance autogeneration in cases where it is more desirable than central-system supply.

Introduction

Most of the attempt to justify rural-electrification projects in New-Directions terms has focused on the impact of electrification on the rural poor. The design and operation technologies of rural-electrification systems, however, have not been subject to the close scrutiny for New-Directions implications that the technology of road construction has. Despite the lack of discussion of alternative approaches to design and operation of electrification systems, it would seem that some of these choices would have considerable impact on how growth in the countryside takes place. Partly because of the lack of discussion and research on alternative design and operation questions, rural electrification was not given as much time in this study as rural roads. The following discussion, then, should be seen as indicative of the kinds of issues that merit further exploration.

AID's impact studies of rural electrification (RE) have focused mainly on household use, as opposed to industrial,

commercial and public uses of rural electricity.¹ The attempt to answer criticisms of rural-electrification projects have also placed most of their emphasis on the benefits accruing to household users of electricity.² This focus of attention on benefits to household customers has contributed partially to the neglect of New-Directions opportunities lying in non-household consumption and in the design and operation of the system itself. Before these

¹It should be noted that the focus of the New-Directions-related discussions and evaluations of RE projects has been on household consumption even when the projects themselves had a production-consumption focus.

²E.g., U.S. Agency for International Development/Philippines, "Nationwide Survey on Socio-Economic Impact of Rural Electrification," 10 February 1978; preliminary results of this study can be found in U.S. Agency for International Development, "Philippines: Rural Electrification V," Project Paper AID-DLC/P2275, 21 November 1977, pp. 51-56; Development Alternatives Inc., "An Evaluation of the Program Performance of the International Program Division of the National Rural Electric Cooperative Association" 28 January 1977; and Development Associates, Inc., "A System for Evaluating the Economic and Social Impact of Rural Electrification in Bolivia," (Final Report), Contract No. AID/otr-C-1382.

other sides of rural electrification are discussed, it is useful to understand why AID has tended to focus on the benefits to household consumption of rural electricity.

Household vs. Other Consumption

Most of AID's rural electrification projects have been promoted, designed and implemented by the National Rural Electric Cooperative Association (NRECA). In 1976 and 1977, for example, NRECA worked on various stages of promotion and design of AID rural-electrification projects for the Philippines, Bangladesh, Pakistan, Syria, Guatemala, Honduras and Bolivia. Outside the engineering design work, AID uses only NRECA as its contractor for the design and implementation of rural-electrification projects. (NRECA does not have the capacity to do engineering design, according to AID; this work is contracted out to private engineering firms.)

The NRECA model, forged out of its experience with rural cooperatives in the United States during the 1930s, evolved mainly out of concern over rural household consumption. The appeal of the cooperative model for rural electrification in the U.S. was an appeal to the potential household consumer who was not large enough to interest the private utilities. The cost of rural household connections was particularly high in the U.S. countryside, where rural settlement patterns were dispersed. This was in contrast to the denser and more nucleated rural settlement of Europe and many Third-World countries. The U.S. cooperative model, then, was infused with a populist appeal to the "little guy" who was being exploited.

by the big utilities. The little guy was the neglected rural household consumer, not the industries or commercial establishments that one might find in the area of influence of an RE cooperative.

The Philippine success story

Before giving some examples of the household emphasis in AID and NRECA decisionmaking on rural-electrification projects, it is important to note one final reason for this emphasis. AID's most successful rural-electrification program has been in the Philippines, where it invested US\$80 million in RE projects over the 1972-1978 period. For AID and NRECA, this successful program became a launching pad for other RE programs in Asia--mainly, in Pakistan, Indonesia and Bangladesh. Rural-electrification projects now account for 40% of AID's food-nutrition lending in Asia.

The Philippine case was somewhat unusual in that rural electrification received a major political and financial commitment of the government because it was seen as crucial to one of its basic political objectives--to win support away from the Communists in the countryside. This political objective meant a strong emphasis on household consumption,³ also reflected in the AID-financed

³The objective of winning over the peasants would not necessarily mean a priority for household consumption; electrified and small-scale irrigation for agriculture would also further such an objective. Though such a use of electricity was not an initial focus of the Philippine program, it was added later as part of a program to create and assist water-user associations. (Continued on following page.)

(Footnote 3 continued) Electrification was not the only rural program in the Philippines with the objective of winning support from the Communists. The "compact farm" program was also meant "to help blunt the threat of insurgency and to bring dissident farmers back to the government fold." Jose V. Barrameda, Jr., "Compact Farming in Camarines Sur," p. 1, Appendix to Frank Lynch, "Rice Farm Harvests and Practices in Camarines Sur...", Social Survey Research Unit, Research Report Series, No. 2, January 1974.

impact studies carried out by the Philippine National Electrification Administration with the technical assistance of the U.S. Census Bureau.⁴ Interestingly enough, the results of the Census Bureau/NEA impact study suggest that the political objective was achieved: the benefit cited most frequently by the new rural household consumers was "an increase in peace and security in the countryside."⁵

The Philippine case, then, was a happy marriage of the AID/NRECA emphasis on household consumption and the high political priority given by the Philippine government to winning over the rural population by supplying it with household electricity. Since the Philippine case is one of AID's most successful stories of rural electrification--in terms of getting the system in place and having it managed well--it is not surprising that the household emphasis of that success story and its evaluations tends to get carried over to other cases.

⁴See footnote 1 above.

⁵P.52 of the Philippine RE loan paper cited above. It is difficult to say to what extent this result was influenced by the form of the survey instrument, whereby respondents were given pre-determined answers to select from--one of which was "an increase in peace and security." Respondents may have felt it was safe to give the peace-and-security answer. This type of response has also been reported in RE impact studies for other countries.

One would like to know what the increased peace-and-security resulted from. Individual household lighting? Village and town lighting? One would think that the village lighting would be the most likely answer. This in itself would be an interesting finding, because it would mean that the major benefit to household consumers of rural electrification resulted from a public-service use of electricity, rather than from individual household connections.

Flat vs. metered charges

The concerns of U.S. rural-electric cooperative development, and its focus on the household consumer, are prevalent today in the myriad decisions that NRECA and AID make when designing RE projects in other countries. NRECA tends to be against the use of flat charges for household consumption, for example, instead of charges based on metered use. Flat charges have been used by the Indonesian power authority and some other countries on the grounds that this saves the additional cost and complexity of meters and their monitoring. NRECA is against these flat rates, in contrast, on the grounds that they are inequitable. The user of little electricity, who is likely to be among the poorest of household consumers, pays the same as the larger user and thus subsidizes the latter's consumption.⁶

The use of flat charges in the Third-World context of frequent blackouts and rationing may actually result in less inequity than one might think. The shortages, that is, put a ceiling on how much anyone can consume, and thus act as a leveler of the distribution of electricity consumption among households. *J* Indeed, the Indonesian power authority combines the flat charges with a device that automatically limits electricity use after a certain point.

⁶ A partial discussion of this difference of opinion is found in USAID, "Rural Electrification Preliminary Engineering and Feasibility Study Report," by the National Rural Electric Cooperative Association, Task Order No. 5, Contract No. AID/pha - 1090, Central Java, Indonesia, August 1977, pp. 62-63.

This limiter, adopted by the Indonesians to ration scarce electricity, ends up performing the same leveling function as frequent blackouts-- and in an even more equitable way. (AID and NRECA have also expressed disapproval of the limiting devices because they are felt to be part of a "shortage mentality."⁷ The conditions of shortage will no longer exist once the Indonesian project is finished, it is felt, and the limiters will restrict the utilization of the new installed plant to full capacity.)

Another reason that flat charges may make more sense in AID-recipient countries has to do with institutional problems of state-controlled electricity distribution. Distribution of electricity is noted for its difficulties in developing countries, partly because of the myriad individual accounts a state utility has to deal with and the vulnerability of such a bill-collecting process to graft and corruption. This contrasts markedly with the organization of electric-power generation, where contact with buyers involves only a few large wholesale purchasers. [√]Anything that minimizes the number of contacts that a state distribution company has with its consuming public, then, will give the company

⁷ Disagreement with the limiters can be found in the citation of the preceding footnote, pp. 49, 63.

a better chance to do well.

Finally, metering is objected to by recipient countries on the grounds of its costliness and cumbersomeness. With flat charging, then, the utility may be more willing and able to hook up a larger portion of the poor population than it would be if it had to do so with metering. The equity benefits of metering, in sum, may be less than their costs. Though flat charges are disliked by AID and NRECA on equity grounds, the alleged superiority of metering on these same grounds may turn out to be academic in developing-country environments.

There are ways other than metering to approach the equity question that concerns NRECA. In areas where homogeneously poor populations are found, for example, lower flat rates could be charged to these consumers than to those living in areas populated by better-off groups. Or different flat rates could be determined, at the time of the electricity connection, based on a measure of the quality of the house or of the number of appliances possessed by the household. Or, as AID tried to do in the Indonesian case, RE development can be limited to homogeneously poor areas.⁸ Though these approaches are a cruder way than metering of getting at equity, they also do not involve the institutional and financial costs that metering does.

⁸ USAID, "Indonesia--Rural Electrification I," Project Paper AID-DLC/P-2244, 2 September 1977.

Protecting household rates

Another rural-electrification issue that merits some exploration is electricity rates. Consistent with pro-household concerns, AID and NRECA have sometimes objected to the charging of lower rates to users of electricity for productive purposes--or for larger-volume purchases by such users--as is often the policy of state power authorities in recipient countries. Pakistan and India are examples, where users of tubewell pumps for irrigation have been allowed to pay considerably less than household users do. The argument against such rate policies is, in part, that household users should not have to subsidize non-household users.

Third-World countries frequently prefer to subsidize productive uses of electric power at the cost of household uses. This preference may relate to the considerations discussed above concerning flat charges vs. metering. Supplying fewer larger users as opposed to many smaller ones, that is, may be a more easily achievable task for a state power authority--for the same reasons that electricity generation is "easier" than distribution.

New-Directions policies are concerned with maximizing the impact of rural infrastructure projects on the rural poor. This means that the costs to household consumers of "paying for" the lower rates to productive uses of electricity should be compared to the benefits to the rural poor of additional employment resulting

from the productive uses of electricity--and from the fact that state power authorities are often more interested in and do better at supplying productive users. Tubewells in particular are known for the increased opportunity they provide to employ additional labor, because they increase the potential to farm the land intensively. On New-Directions grounds, then, priority might be given in some cases to certain non-household uses of electricity, perhaps even explicitly at the expense of household users. As in the example of metering vs. flat charges, the loss in equity to household users may be less to the rural poor than the gain in increased employment opportunities resulting from productive electricity use.

All this is not to say that non-household uses of electricity will always have higher benefits than household uses-- or that productive uses of electricity will even have the employment benefits predicted. Some recent literature, for example, suggests that (1) the employment-generating effects of rural light industry are not really what they were thought to be,⁹ and (2) that productive uses of rural electricity yield such high returns that

⁹This reasoning, as well as the other side of the argument, is presented in Dwight Perkins, Rural Small-scale Industry in the People's Republic of China (Berkeley: University of California Press, 1977). For a summary of the case in favor of rural light industry, on pro-employment grounds, see International Bank for Reconstruction and Development (IBRD), "Rural Enterprise and Nonfarm Employment," A World Bank Paper, January 1978.

users do not need subsidies to adopt it.¹⁰ Despite these doubts, however, recipient countries still show preferences for a promotional approach to non-household rates. This approach needs to be evaluated in terms of its New-Directions potential.

The position I am taking with respect to electricity rates, and the use of them for subsidy and taxing purposes, is not a popular one in the literature on rural electrification.¹¹ Tampering with rates in this way is considered financially untidy for the electric utility, whose prime concern should be to make itself a self-sufficient enterprise. The institutional viability of these enterprises, it is felt, should not be burdened with redistributive or promotional policies; more efficient subsidies and taxes should be found to implement these policies. The productive users of electricity, moreover, are said to be able to pay market rates for it because the returns to such electricity use are so high--as witnessed by the fact that firms often buy their own high-cost generators when there is no alternative source of electricity. Subsidies to productive users, then, are said to have little net impact on the growth of production. for they simply reimburse

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For a summary of the argument against "promotional" rates for productive uses of electric power, see IBRD, "Rural Electrification," A World Bank Paper, October 1975.

11 See, for example, the IBRD paper on rural electrification cited above.

these users for costs that they were willing to undertake anyway. Finally, the effects of promotional rates are said to be regressive. The subsidy is often financed out of the household rates, that is, which means that the "little guy" ends up subsidizing the big one.¹²

The arguments against using electricity rates for subsidies and taxes make good sense. The main reason I question them is that the use of electricity rates to pursue development strategies is common practice in Third-World countries--as it has been in the history of U.S. electric-power development. While AID and IBRD often object to the subsidies, the recipient countries continue to apply them. Since AID often ends up going along with the subsidies in the end, there is some reason for trying to figure out how one might live with them better--instead of steering clear of them completely for economic reasons.

The donor world is much less accustomed than Third-World countries to living with the concept of state companies as mechanisms through which to channel national development policies.

¹²The proponents of this anti-subsidy/tax position do not reject the concept of subsidizing power rates for rural electricity across-the-board, at least in the early years of the system's growth. Because the unit cost of supplying rural electricity is so much higher than for urban electricity, it is felt, the rate should not reflect the full cost of providing service in the early years. If it did, it is argued, little electricity consumption would occur.

Donors are more interested in the potential for financial self-sufficiency of revenue-earning public enterprises. They are concerned with the independence and protection from the rest of the public sector that revenue will provide. Third-World governments often see just the opposite side of the picture: the revenue-earning aspect of the service presents one of the scarce opportunities to execute smoothly the subsidy or tax features of certain development strategies. An important part of this opposite picture is that well-working institutional mechanisms for dealing out subsidies and collecting taxes are hard to come by in developing countries. Such mechanisms are difficult and expensive to create and are usually vulnerable to graft. When a ready-made mechanism for both subsidies and taxes comes along, like electricity charges, it is hard to resist. In comparison to the more difficult and direct approaches to the subsidization and taxation of various sectors, then, the ready-made mechanism of electric-power rates must seem quite effective to policymakers in Third-World countries--and worth the cost imposed on the financial independence of the power entity.¹³

¹³

This same logic also lies behind the insistence of Third-World countries on using concessional interest rates on agricultural credit--despite the barrage of donor criticism and common-sense economic reasoning against this position. Like electricity rates, interest rates are a handy instrument to latch onto: they are administered by an already-existing institution, with considerable institutional representation in the geographic area where the to-be-subsidized sector is located. As with electricity rates, interest-rate subsidies represent a quick and ready vehicle for getting something difficult done.

Despite the current wisdom to the contrary, AID should take a closer look at the possibilities for using the electricity-rate structure to pursue some New-Directions objectives. Recipient countries will probably use the rates for similar purposes anyway. And there may be good institutional reasons, as noted above, to prefer the state power companies as instruments for executing such policies. These reasons may be just as powerful, in a different realm, as the economic arguments against doing so.

Household consumers and the rural poor

✓ Impact studies of rural electrification consistently find that the household users of rural electricity are the better off among the rural population.¹⁴ This is not surprising, since household electricity usage requires expenditures for hookups, wiring,

¹⁴ E.g., University of Florida, Center for Latin American Studies, "Rural Electrification: An Evaluation of Effects on Economic and Social Changes in Costa Rica and Colombia," 31 August 1973; IBRD, "Costs and Benefits of Rural Electrification--A Case Study in El Salvador," P.U. Report No. RES 5, 1975; USAID/Philippines, "Socio-Economic Impact..."

monthly consumption, and for the purchase of appliances.¹⁵ Where rural electricity actually succeeds in reaching truly poor households, moreover, usage is virtually limited to lighting. In these cases, electricity does not succeed in substituting for wood and other fuels in cooking, the principal use of energy by poor rural households.¹⁶

It is difficult to provide a strong New-Directions justification for rural electrification if one rests the argument mainly on household consumption: either the poorest of the poor are excluded, or their gain is limited to the substitution of electricity for other fuels in lighting. It may be that the substitution of electricity for other sources of lighting in poor households represents an important gain for the rural poor. But AID needs to show that this gain is greater than those to be had from the development of non-household uses of electricity, or

¹⁵ Some AID missions have recognized the regressive effects of electricity's user costs on benefit distribution. They have attempted to eliminate, lower, and/or finance the capital costs of connecting to the system. The concern for lowering connection costs also arose out of the finding that many rural inhabitants would not connect up to the proposed systems at prevailing charges--which would make it impossible to financially justify the RE project.

¹⁶ E.g., the Philippine impact survey cited in the above note, pp.4-5; the Nicaragua case study in Development Alternatives, Inc., "An Evaluation of the Program Performance of the International Program Division of the National Rural Electric Cooperative Association" 28 January 1977.

through investment in other rural services like water supply.

All this is not to say that the benefits of household consumption are not worthwhile ones. It is just that household consumption may not be the trump card that rural electrification has to offer with respect to the rural poor. In one sense, then, AID's and NRECA's concern for equitable treatment of the household consumer may sometimes lead to a more "regressive" approach with respect to the rural poor: greater employment opportunities for the poorest are neglected in order to protect the household consumers of electricity, who are not the poorest. Lower electricity rates for non-household consumption, then, might in some cases be more equitable because they transfer the benefits of a project from the better-off beneficiaries of rural electricity (the household consumers) to the poorest-off beneficiaries (those who gain employment because of the use of electricity).

Electric utilities and appliance-using consumption

It is the nature of electricity-producing companies that they engage in the promotion of electricity use. Increased usage gives them greater revenues and evens out the peaks and troughs of demand, thus increasing their load factor.¹⁷ Promotion of electricity

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The load factor, expressed in percentage terms, is the ratio of average capacity usage to peak capacity. The higher the load factor, the less unutilized capacity there will be.

use by utilities occurs even in systems where there are periods of rationing or outages resulting from faulty equipment and maintenance, inadequate installed capacity and, in hydro-based systems, lack of rain. The consumer, rather than the utility, incurs the costs of the idle or damaged appliances during the rationing periods, or the costs of privately regulating uneven voltage. Increased consumer use of the utility's electricity supply, then, increases its revenues during non-rationing periods and imposes extra costs mainly on the consumer during shortages.

Rural electrification is considerably more costly than urban electrification because of lower population densities in the areas served. Put together with the necessity of installing a minimum costly physical plant from the start, this means that rural electric utilities can have considerable excess capacity, and thus operate at high unit costs, for many years. If run well, then, a rural utility will have to promote electricity consumption even more aggressively than the urban utility.

For all the above reasons, it is in the utility's interest
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 to create and serve an appliance-using clientele. One such
 promotion technique is the offering of installment credit--through
 electric cooperatives, for example--for the purchase of electrical
 appliances.¹⁹ For purely business reasons, then, it may be against

¹⁸ A passage from a NRECA report on the Indonesian rural-electrification project gives a sense of these promotion concerns: "This electric cooperative will be providing electric utility service to a very large group of persons who have never before used such service... A great amount of education and power use promotional work must be planned and carried out by the sponsoring agency of the government and by the cooperative itself. Very few of the prospective customers have ever had the opportunity to enjoy use of electric service. Viability of the project depends on a high rate of connections and an increasing use of power over the years... Full utilization of the system should be encouraged. Member services specialists can show consumers how to benefit from additional uses of electric energy. Night lighting and other off-peak consumption of power will give the system a better load factor" (p. 91).

Also, "In countries and in times not hampered by energy shortages, there should also be an incentive component to the rate schedule to encourage consumers to make more abundant use of electricity. They must believe that their investment in a greater use of electricity is worthwhile when equated to the social and economic benefits derived from that use" (p. 70). USAID, "Rural Electrification Preliminary Engineering and Feasibility Study Report," by NRECA, South Sulawesi, Indonesia (August 1977). Also, "In every home, there are many potential uses for electricity. Consumers must be shown that the electric service is better and cheaper than alternatives" (p. 77). USAID, "Preliminary Engineering..." by NRECA, Central Java (August 1977).

¹⁹ The Indonesian mission has suggested that the state power authority use credit in the housewiring fund, after it is rolled over, to finance consumer purchases of water-heating coils, hot plates and rice cookers. USAID, "Indonesia--Rural Electrification I," No. 497-0267, Volume II (August 1977), Annex G-1, p.3.

the interests of rural electric cooperatives and other local utilities to make decisions about rates, investments, and other matters that would benefit the poorest sectors of the population--especially if any of these actions are financed out of rates charged to the appliance-using clientele. There is somewhat of a conflict, in sum, between the objectives of maximizing the impact of rural electrification on the rural poor and of creating and running a well-functioning rural utility.

AID's rural-electrification coops provide an opportunity to look into the question of what type of utility can be more attentive to the rural poor--public grids, private grids, or autonomous local utilities (public, private or coop). The above-cited impact study of the Philippine rural electrification found a somewhat lower income level among users in villages and towns supplied by coops rather than private or state utilities. But the difference in income levels was not great enough, nor the analysis of causality comprehensive enough, to determine whether this finding has any significance with respect to the coop model. An AID-contracted study of RE cooperatives in Latin America found that they charged more for power than the state-operated grid systems.^{19a} The study did not look into whether this difference was due to real differences in cost, or to different pricing and profit policies. Since AID relies so heavily on the coop model for its rural-electrification programs,

^{19a} Development Alternatives, Inc., "An Evaluation of the Program Performance of the International Program Division of the National Rural Electric Cooperative Association," 28 January 1977.

it is important that this type of finding be investigated further. It may be that a strong business orientation of a utility, along with its emphasis on appliance-using clientele, is the only way to get adequate electric utilities established. If that is the case, then rural electrification may not be conducive to having its impact directed to the rural poor.

Conclusion

The discussion above suggests that the greatest New Directions impact of rural-electrification projects may lie elsewhere than with the benefits to rural households. Concern with providing equity to household users—or distributing equity properly among household users—may result in a fairly limited impact on the rural poor. The focus of equity concerns on the household consumer is somewhat misplaced outside the context of U.S. rural history, where rural unemployment was not a major problem the way it is in the Third World today. In the Third World, moreover, the plight of the "little guy" at the mercy of the "exploitative" private utility is not a gripping issue. Instead, a good part of the gains from electrification for the poorest may occur through electricity-using production activities that increase employment. In addition, the impact on the poor of public uses of electricity—like village hospitals and village lighting—may be much greater than the availability of electricity for individual household use.

That rural electricity can have a positive effect on the rural poor through the employment effects of non-household uses is not a new idea. But AID's tendency to focus on household consumption in its evaluations of rural electrification has resulted in a neglect of this potential. More specifically, AID should (1) look into the way this particular impact has occurred in rural-electrification projects and devise criteria for maximizing it; (2) correspondingly, devote less evaluation funds to household electricity impact studies: these studies read as somewhat forced attempts to "squeeze" New-Directions justifications out of rural-electrification projects, trying to smooth over the fact that household electricity will be used mainly by the better-off; and (3) try to break loose from the unquestioning acceptance of the conventional wisdom on how to design and run rural-electrification systems.

Forward Linkages

If an electric power system is put in place and managed reasonably well, one can be fairly certain that households will be connected up to it and receive its benefits. There is much less certainty, however, about whether employment-generating uses of electricity will occur, as well as public-sector uses benefiting the poor. Though the non-household use of electricity may have a greater potential than household use for having an impact on the rural poor, then, the certainty that such a favorable outcome will occur is not as great.

AID should attempt to increase the probability that the potential benefits of non-household use will actually take place-- instead of settling mainly for the more certain household benefits, which do not always fit New-Directions objectives that well. Some possible ways of exploring this potential are (1) to look at cases where rural electrification has had powerful employment effects, and try to uncover the sequence that led from the power facilities to the employment impact; (2) to analyze the ways in which various "technical" decisions--about rates, layout of the facilities, selection of communities to be served and geographical sequence of electrification--can influence the location of rural industries and the type that locate; and (3) to try to forge the link between electrification and employment-creating uses in the AID project.

itself--for example, by including credit and technical assistance for location of small labor-using industries.

Rural-electrification projects tend to be looked at as technically pat. Design and operational questions are seen as being subject to standard solutions.²⁰ It is important to recognize, however, that there are technical and organizational alternatives, and that they can have different development impacts. In many instances, the technical choices necessary to bring about the desired linkages may be considered contrary to good standard practice--as labor-intensive road construction techniques were considered for many years. It is not that contractor organizations cannot be convinced or directed to make decisions that maximize such linkages; they are simply not used to looking for the opportunities for such decisions in the myriad choices they make when designing

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A NRECA discussion of engineering and construction for the proposed North Central Klaten RE project in Indonesia is an example: "Large outlays of money for system design can be avoided by using already available standard design/criteria, construction specifications and drawings, and approved materials. All of these have been thoroughly field-tested in close to a thousand rural electric cooperatives, and are available from the Rural Electrification Administration in the U.S.A" (p. 39). USAID, "Preliminary Engineering..." NRECA, Central Java.

their projects. Ultimately, then, AID should learn more about how to identify these technical alternatives and their differing development impacts. What it learns should inform the instructions it gives to its rural-electrification contractors.

Another approach to forging the link between rural electrification and electricity uses that impact favorably on the rural poor is for AID to be selective about where it does such projects. AID might finance RE projects only with governments that are already showing a strong political and financial commitment to making the link between rural electrification and employment generation. Usually, however, a certain type of AID project seems to "spread" from one country to the next--often because it worked well in one country, like rural electrification in the Philippines, or because it fits AID's programming constraints, like sector lending in the late 1960s. This way of deciding what to do in any particular country is not without merit. Learning by doing takes place, and each successive experience with a particular type of project is a little more informed. (This benefit is often sacrificed, however, because of the pressure to do certain types of projects simultaneously.) But the "spread" model does not allow for much selection of projects on the grounds of what works best in the country at hand. The soundest New-Directions justification for a rural infrastructure project, then, may be related to parallel commitments and programs

that a particular recipient-government is undertaking--programs that will maximize the impact of the infrastructure facility on the rural poor.

Services to the rural poor

One item consistently mentioned in AID's impact studies of rural electrification was the way in which electricity facilitated the supplying of public services that were not previously available-- a community clinic that could not operate without electricity--using sterilization procedures, a school that could not operate at night without electric light, etc. To the extent that such services are free, they can reach the rural poor more than individual household electricity. AID should attempt to identify those electricity-dependent services that have the greatest impact on the rural poor and, as in the case of employment-creating uses, try to force the linkage in the project between the supply of electricity and the supply of the service. A local-clinic component for example, could be included in a rural electrification project.

As in the case of employment-generating uses of electricity, there may be some argument to having the more "regressive" household sector subsidize these public uses of electricity. If the poorest of the rural poor are not usually able to acquire individual household connections, then lowering the costs of the hookup may

not constitute that significant a benefit to those poor. Indeed, financing the hookup costs may simply result in subsidizing the capital costs for better-off households--costs that they might have been willing and able to pay on their own.

(In New-Directions terms, then, the more significant benefits of rural electrification may lie not so much in lowering the capital costs of household connections as in maximizing the creation of electricity-using services that benefit the non-adopting poor. To this end, one might want to promote the community uses of electricity and rely partly on the "better-off" household connections to help pay for them through "tougher" rates. (Note the contradiction between this suggestion and the normal tendency of electric utilities, noted above, to promote the greater use of household electricity.) In order to clarify some of these issues, it would be useful to have some evaluation work on various AID attempts thus far to lower the cost of the hookups. It is important to find out if non-adopters are staying behind because they cannot afford the capital costs of electricity--or the operating costs. If the latter is the case, then financing the hookup charges will have less potential than other approaches for extending the benefits of electrification to the rural poor.



Backward Linkages

✓ Parallel to concerning itself with the linkage between rural electricity and employment-creating uses of it, AID should try to maximize the linkage between electrification projects and local suppliers. Much of the equipment for RE projects can often be manufactured locally at competitive prices--particularly poles, lines, conductors, small transformers, switchgear and substations. In general, public-sector infrastructure projects usually account for large shares of the gross capital formation that takes place in developing countries and therefore represent significant opportunities to feed demand into local industry. Because of this potential of its infrastructure projects, AID should require that such projects attempt to feed their demand into local industry. Similarly, AID should ask what decisions are being made about project design and specifications that will facilitate local supply of the project.

The importance of requiring that infrastructure projects show what they are doing to feed demand into local industry cannot be overemphasized. This is because the stakes are high, and because the biases of the system all run in the other direction, including AID procedures themselves. It is important to know not only what attempts are being made to maximize local procurement,

particularly of labor-intensive goods, ✓ But it is also important to find out how the technical specifications for the project can be changed so as to qualify existing local production. The questions should be asked in a way that elicits an actual attempt to do things differently, rather than just a "cosmetic" response. To obtain adequate answers to such questions, it may be necessary to hire an independent consultant with no vested interests in having the project go forward as such projects have in the past. In fact, it would be useful to contract an entity that has a vested interest in making the project go the other way--a local manufacturing association, the representative of a ministry of industry and commerce, a labor union. A separate office in AID responsible for technical assistance to local industry would be another appropriate entity with the "right" vested interest, as discussed further below.

Arrangements with local suppliers

The Philippine rural-electrification project provides one example of how AID can link its projects to local-industry supply. AID had insisted that the Philippine project use locally-supplied rather than imported wood poles for stringing the electricity wires. The Philippine electrification authority wanted to import the poles since local sources of supply were not adequate. AID prevailed in this case, and AID-contracted technicians helped set up local timber operations. Today the electricity poles in the Philippines are fully locally supplied.

The case of the wooden poles was a particularly apt occasion for insisting on import substitution, since the RE network being constructed would provide a constant and predictable demand for replacement poles in the future. In the Indonesian case, AID was less successful in forcing this type of linkage. NRECA had surveyed the availability and suitability of Indonesian woods, and strongly recommended the establishment of, and procurement from, a local wood-pole industry.²¹ The Indonesians wanted to continue to import steel poles at three to four times the projected cost of producing wood poles locally--rather than commit themselves to the promotion of a local-supply operation. AID therefore excluded the poles in its share of financing for the project, and the Indonesians paid for the imported steel poles themselves. Similarly, NRECA has tried to facilitate the purchase of locally-produced conductors in some of its projects in Asia, as well as other hardware. It would be useful to find out more about such attempts, and the conditions under which they can be successful.

²¹ An extensive discussion of Indonesia's wood-supply potential for the RE project can be found in USAID, "Preliminary Engineering..." NRECA, Central Java, pp. 45-48.

A significant obstacle to feeding the demand for AID-financed infrastructure projects into local industry is the tariff exemptions granted such projects in many developing countries. Recipient-government tariff policy and AID compliance with it inadvertently undermines the local-industrialization objectives that the tariffs are meant to serve. AID should try to devise a strategy for its infrastructure projects that deals with this particular problem. An agreement might be sought whereby for certain cases the more costly local product would be purchased, and/or the tariff would not be waived. The tariff exemption, moreover, could be applied to the imported raw materials required by the local supplier, and not just to the project.²²

The local items selected for special treatment could be those that were most labor-intensive in their production and for which a stream of future demand would be assured through maintenance and replacement needs or because of a long-term program of future construction. The wood poles are a case of this type of predictable and continuous future demand. As part of such an arrangement, AID's

labor-intensive?

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This suggestion was made to NRECA by the manager of an Indonesian wire-and-cable-fabricating plant. He felt he could offer internationally competitive prices on ACSR and all-aluminum cable if he could import the rod and cord-wire duty free. Alternatively, he suggested that the Indonesian government use part of the foreign-currency proceeds of the AID loan to purchase the required raw materials, which could then be furnished in bond to his plant. USAID, "Preliminary Engineering...", NRECA, Central Java, p. 49.

rural-electrification projects could also include technical assistance and/or credit funds for enabling local industry to supply certain items for such projects—items that are labor-intensive in production and for which there will be an ongoing demand.

Certain bargains might be struck by AID and the central government with the electric-power entity. The government, for example, might subsidize the extra cost of the selected local products to the power entity. At the same time, it could inform the local producers that it was subsidizing their high-priced and/or lower-quality production now in exchange for diminution of the tariff in the future. Whatever such arrangements might be, it is important that they be sought with the central government and not with the power entity. The latter, understandably, will not be interested in paying more to achieve the employment-creating and development impacts of local procurement. Indeed, the power entity will normally resist local procurement on the grounds that it is being forced to pay a higher price in exchange for a benefit to the economy that it does not reap directly.

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In the longer-run, of course, the benefit of this action can accrue to the power entity in the form of a reliable and reasonably-priced local source of supply for future maintenance and construction needs.

Specifications

The specifications of infrastructure projects provide considerable opportunities either to avoid or encourage local suppliers. Most specifications for internationally-financed projects will tend to exclude local suppliers, without necessarily meaning to. This happens because specifications get written in ways that are customary and familiar to the international design and engineering firms that work on such projects. These ways of doing things grew out of the resource availabilities and the relative factor endowments of the Western industrialized countries. Specifications for roads, for example, usually require materials for the road base that are best handled with equipment- rather than labor-based techniques; base materials more suited to labor-intensive techniques rarely appear. Thus possibilities that labor-based techniques will be used are considerably narrow under current spec-writing customs--no matter how earnestly the donor and recipient are interested in promoting them.

To the extent that the problem of labor-intensive techniques and local suppliers is embedded in specifications, AID will have to make a deliberate foray into spec-writing practices to see how they can be neutralized at the least. The engineering department of AID is currently engaged in such an endeavor with respect to roads, trying to remove some of the pro-equipment biases

of standard roadbuilding specifications.²⁴ AID could do the same thing with rural-electrification projects, along with the additional task of removing anti-local-supply biases.

It may be more difficult to systematically remove anti-local-industry biases from specifications, as opposed to anti-employment biases, because the availability of local materials and the adequacy of local industry will vary from one country to the next. Thus AID may have to scout the local situation for each individual project, previous to drawing up the specifications. Though this task might seem cumbersome, the development and New-Directions impacts it could facilitate may well be greater than that of the electrification project itself--and at an incremental cost that would be small in relation to the project.

²⁴ USAID, Africa Bureau, "Infrastructure Projects," by Palmer Stearns, 9 November 1977; USAID, "Utilization of Local Labor on Highway Construction Projects" (Draft), by Palmer Stearns, n.d.

An office of backward linkage

Because of the high return to be gained from a backward-linkage approach to its construction projects, AID should set up a separate office to deal only with this matter. Such a unit would be a more operational and potent way of introducing a "technology-transfer" program for industries in recipient-countries--in comparison to running such a program independently of AID's construction projects. The latter has been recently proposed for middle-income countries. The office could have a roving staff, mainly engineers, who would deal only with this particular question for each infrastructure project financed by AID.

Making the local-supply question the function of an office devoted exclusively to it--rather than of each country mission in the preparation of its project paper--increases the likelihood that the task will receive good treatment. If the task is assigned to the mission's project preparation team, it will be looked at as an additional burden, understandably, to be dispensed with as quickly as possible. Leaving the specifications the way they are and letting procurement fall where it may will be a much less time-consuming task. It will take considerably more time to find out that local industry may actually be able to supply some items, to have the specifications re-written to allow for this, and to work out an arrangement with local suppliers.

Because of the costs to the mission of taking such a matter seriously, in short, it cannot be expected to act as an advocate of local-industry supply. An office whose only responsibility was the promotion of local industry would be fulfilling its role--rather than cutting into its scarce time--by coming up with possibilities for local supply and with ways of changing specifications so that this could happen.

The advocacy role of the party in charge of facilitating local-industry supply will be crucial to the success of such an undertaking. The effort will come up against the reluctance of those who will worry about the additional work this approach might give them, and of those who are used to having structures designed in certain ways. The success of such an attempt, then, will be more dependent on the separation and role of the office than its size. One person might achieve more than the total result of every mission giving consideration to the issue in every construction project--and coming up with a boilerplate "status-of-local-supply" statement.

In order to gain some ideas about how such an effort could work, AID should look at the scattered experiences of success in this area--as in the case of the Philippine telephone poles noted above. AID would have more leverage with central governments in creating a mechanism for feeding project demand into local industry if the mechanism were routinely used for all AID-financed

construction projects, not just for a particular project or for a particular sector like electric power. In so doing, AID would increase the value of the procurement at stake to a level where it would be strongly in the self-interest of the central government and the private sector to participate. If such a mechanism were to work one time around, moreover, it might be considered by other donors.

The Case for Electrification and Central-station Systems

✓ AID's justifications of rural-electrification projects normally assume that (1) rural electricity is more environmentally and economically sound than existing energy sources,²⁵ and (2) central-station electricity is more economically and environmentally

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E.g., the Indonesia RE economic analysis states that "given the improved quality, reliability, and convenience of electric power vis-a-vis alternative energy sources..." (Annex K, p. 1, italics mine). USAID, "Indonesia—Rural Electrification I," No. 497-0267, Volume II, August 1977. Also, "bulk generated-electricity is a more efficient source of energy for household uses (lighting and cooking) or productive uses (lighting and motive power) than the alternative energy sources currently available" (p. 1). Also from the same annex, "the use of wood for cooking has resulted in a severe reduction in forest cover...which is causing serious soil erosion problems. The reduction of soil erosion may be another type of resource savings which results from rural electrification" (p. 10). The Philippine RE economic analysis refers to the kerosene cost savings and hence foreign exchange savings to result from rural electrification (pp. 59-60). USAID, "Philippines:Rural Electrification V."

efficient than independent diesel generators (autogeneration).²⁶

The environmental justification made for rural-electrification projects is that the two alternative sources of household energy-- wood and kerosene--are environmentally undesirable. The use of wood for fuel causes deforestation and erosion, it is said, and kerosene pollutes the air. The economic argument against kerosene is that it is a petroleum derivative, the use of which should be minimized on price and balance-of-payments grounds.

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The DAI evaluation of NRECA's RE programs reports that NRECA believes there can be "no serious development without central station electricity." Development Alternatives, Inc., "An Evaluation of the Program Performance of the International Program Division of the National Rural Electric Cooperative Association," 28 January 1977. The DIS summary of the Indonesia RE paper states that the government of Indonesia "has provided expensive and unreliable small diesel generators in isolated towns."

The social analysis of the Jordan RE paper has quite representative passages on autogeneration. "Several villages are presently served...by privately-owned diesel generators...of old vintage and ill maintained and thus unreliable...To some extent all the foregoing benefits of central-station electricity, are available through privately-owned generators, however, the quantity and quality of the electricity provided is uncertain. Public service will...raise the standard of living by encouraging the seeking of employment and increased income with which to purchase household appliances and luxury items such as television sets" (pp. 26-27). USAID, "Jordan: Rural and Urban Electrification," Project Paper AID-DLC/P-2238, 25 August 1977.

These above-stated assumptions may be accurate in some cases and not in others. In any particular case, however, they need to be proven true, because a complete analysis of the matter could easily arrive at the opposite conclusion in many instances. With respect to wood, for example, AID's impact studies of rural electrification have themselves shown that a majority of household users do not substitute electricity for wood in cooking and ironing.²⁷ Indeed, it was found in the Philippines that even in households using electricity for refrigerators, fans and television sets, wood frequently continued to be used for ironing and cooking.²⁸ These findings suggest not only that many of the rural poor will not substitute electricity for wood but that electricity is not competitive with wood. Contrary to what is assumed in loan papers, then, the adoption of electricity does not seem to have a significant impact on the household use of wood for energy. Even in cases where there is substitution of electricity for wood in cooking, it is likely that the better-off consumers are the ones who are making the substitution. This leaves a significant amount of woodcutting still being done by the poorer electricity users, not to mention the non-adopters.

²⁷ E.g., USAID/Philippines, "Socio-Economic Impact..."

²⁸ Ibid., p. 3.

To the extent that woodcutting is a byproduct of slash-and-burn cropping systems, its use or non-use as household energy will be determined more by that fact than by whether or not electricity is available. In that wood is frequently an input in the joint production of cooked foods and agriculture, moreover, it may be difficult to offer electricity at a price low enough to induce the substitution of electricity for wood as energy for cooking. For many of the rural poor, moreover, the acquisition of firewood requires no cash outlays, and only the expenditure of household labor. Electricity, in contrast, requires a capital outlay for a hot plate and iron, and regular cash outlays for continued usage. In reality, then, not much is being achieved by rural electrification in the fight against deforestation, and the "conservation benefit" is hardly worth mentioning. AID can work on deforestation problems more directly than through rural electrification-- with greater impact, and in ways that take into account the wood-gathering economies of the rural poor.

With respect to the benefits of substituting electricity for kerosene in household lighting, one cannot argue that electricity is preferable on environmental grounds unless one completes the comparison. That is, the pollution caused by oil-based and coal-based thermal plants that generate electricity for lighting must be shown to be less than that caused by kerosene-based lighting of households--

not to mention any additional pollution caused by industrial or commercial operations that establish themselves as a result of the new availability of electricity.

With respect to the petroleum- and foreign-exchange-saving "benefit" of switching from kerosene to electricity, the same argument applies: one must show that the new electricity-generating thermal plants, and the industrial growth they facilitate, would cause less petroleum consumption than existing kerosene lamps.²⁹

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The economic analysis of the Indonesia RE paper is the best attempt to make such an all-inclusive analysis of the fuel-savings question. (USAID, "Indonesia--Rural Electrification I," (August 1977), p.14; and USAID, "Indonesia--Rural Electrification I," Annex K, pp. 7-10.) It compares the economic cost of generating a kwh-equivalent of energy derived from kerosene and that from electricity. It also compares the fuel-oil needs for total Indonesian electricity consumption to those required for current kerosene consumption in all uses. The latter comparison pertains to the issue discussed in the text, but is not specific enough to determine whether the results are relevant--and does not seem to include increased oil consumption resulting from expanded uses complementary to the new supply of electricity. The Indonesian RE project, for example, includes the introduction of new fuel-oil-using diesel plants.

As mentioned above, moreover, electric utilities promote the increased use of electricity as part of good management practice. A proper comparison between the petroleum costs of kerosene vs. electricity, then, would have to include the increased energy usage resulting from electricity, and the resulting increased fuel demands.

To a certain extent, environmental arguments for rural electrification are "boilerplate" and thus should not be taken seriously. They reflect the current preoccupation with environmental issues and the demands made upon AID to be responsive to them. But the arguments should be more carefully treated, because they can justify actions that are in direct conflict with New-Directions objectives—and because there is ample room in AID's projects for serious dealing with these issues. A concern for lessening the use of petroleum derivatives in the generation of energy, for example, could take the form of financing micro hydro installations. A concern for deforestation might take the form of providing household sources of energy that could compete with wood and thus would be adopted. Or, such concern could lead to a program to change the land-tenure pattern, common in Third-World countries, which leaves the rich valley bottomlands to large farmers and forces peasants to farm the mountainsides.

Autogeneration vs. central-station systems

Most justifications of rural-electrification projects state that these new systems will replace the "higher cost" and "inefficient" alternatives of independent local diesel generation (autogeneration).³⁰ Central-station electricity is assumed to be superior. This assertion, which may be true in some cases and not in others, is stated rather than proven in AID project papers.

Maintenance is a major problem in electricity systems in Third-World countries--especially in the case of rural systems, where so much elaboration of the transmission system is necessary. The maintenance problem is not peculiar to electric power; it exists just as seriously in other infrastructure projects, like roads and water supply. Most analyses of the costs of central-station electricity vs. autogeneration, however, do not take into account the lack of maintenance and the costs of the resulting downtime in the system. Like the cost-benefit analyses of roads, these comparisons assume that maintenance will be forthcoming. AID's long experience with these types of projects has shown that maintenance is not forthcoming, more often than not, and that losses from its absence are considerable. The Pakistan electric power network, for example,

³⁰ See footnote 26 above.

is said to sustain losses of 35% of the electricity generated-- resulting principally from inadequate maintenance and, to a lesser extent, theft. An argument for rural electrification, then, must show that even with the normally high amounts of electricity loss, centrally-generated and distributed electricity is more economic than a series of unconnected local systems. Typically, however, the cost comparison assumes that the proposed project itself will cure the maintenance problem.

Outages and voltage variations are characteristic of electricity supply in developing countries, both in central and autogenerating systems. Central-system supply tends to magnify the losses from downtime by transmitting them to all connected localities, while the failings of autogenerators affect only the immediate locality. In making the comparison between central-station and autogenerated electricity, then, one needs to compare the losses from downtime as between the two systems. Since central-station electricity is subject to problems in the extensive transmission network of an RE system, as well as in the generation system, a set of independent municipalities supplied by independent generators might well experience less aggregated blackout time in any one year than a central system supplying the same localities.

An example of the kind of cost considerations being raised here is provided by the DAI evaluation of a NRECA

rural-electrification program in Nicaragua.³¹ The study reported that the agro-industrial firms using the new central-station electricity also owned their own diesel generators. The diesels, the firms said, were more reliable than the central-system supply. This was not simply a case of making good use of generators already owned before the advent of central-system electricity; some owners reported buying the generators after central-system electricity became available because the latter could not be counted upon. (Even for those who own generators before central electricity is available, the retention of such generators is costly because deterioration occurs when the equipment is not in frequent use.)

The result of introducing central-system electricity in the Nicaraguan case, then, was not necessarily to substitute lower-cost for higher-cost electricity. To a certain extent, the new system supplemented rather than substituted for the existing higher-cost supplies. The cost to the agro-industrial consumer of this combination of private autogeneration and central-system supply may have been cheaper than using autogeneration only. Rural-electrification systems do not normally charge the full cost of supplying power, at least in the early years, because these unit costs are so much higher than those of urban electricity supply. Thus the

³¹ DAI, "An Evaluation of the Program Performance of the International Program Division of the NRECA," 28 January 1977.

autogenerating consumer might save something by substituting some of the central-system supply for the previously autogenerated supply. The cost of this particular electrification project to the economy rather than the autogenerator, however, was clearly not less than the existing system of "inefficient" autogenerators. The new system, that is, included the operating and deterioration costs of keeping the autogenerators in service, in addition to those of putting in and running the central-system supply. The Nicaragua study shows, in sum, that the costs of central-station supply under the conditions normally prevailing in developing countries can not always be assumed to be less than those of autogeneration.

There is an institutional reason that central-station supply involves so many losses for rural-electrification systems in developing countries. State power entities have shown themselves to be better at generation than at distribution of electric power, for the reasons noted above. Rural-electrification systems represent the greatest possible elaboration of the transmission system, and thus involve an activity where state-sponsored management of electric-power supply tends to be weaker. To move from a set of independent autogenerated localities to a central system, then, involves a more demanding task of management--as does the move from generation to distribution. State power companies, usually already in charge of power development in recipient countries, are less up

to this type of task than to others. Thus a group of independent autogenerating companies may produce better aggregate performance, simply because the integration of electricity supply to these separate localities is not necessary.

For all these reasons, the timing of the move from autogeneration to central-system supply should be conservatively determined. If AID makes the move before the management capacity is in place, then the economic edge that central-system supply has over autogeneration may not really exist--at least for many years. There may well be many cases where a more efficient way of providing rural electricity is to finance the growth of separate autogenerated systems, thereby avoiding an existing and weak state power authority. Or, the best sequence for developing management capability for rural electrification may be through previous mastery of the easier task of generation. Or, as in the case of the Philippines, the best path may be the creation of a separate RE system with coops from scratch. AID should look at the rural-electrification success stories of the Philippines--as well as of Taiwan and Japan--with these management questions in mind. An attempt should be made to understand what the path of institutional growth and maturation was in these cases--and whether outside assistance was able to overcome the kinds of management weaknesses found in the other Asian RE programs today.

The unique success story of rural electrification in the Philippines provides at least one answer to the above questions. The existing state power company in the Philippines has been prohibited by law from doing anything but generation. Thus when AID and NRECA moved in, they had clear ground on which to create a new rural-electrification administration, independent of the state power authority. In most other countries where AID has rural-electrification programs or aspirations, this is not the case. It has to work with an existing state power authority, most of which are admitted to be weak. AID's ability to create something from scratch in these other situations is limited--not only because of the uniqueness of the Philippine commitment to electrification and receptiveness to AID and NRECA--but because of already existing prerogatives and preferences on the part of the state power authorities. In Indonesia, for example, there was considerable conflict between the state power authority (PLN) and AID/NRECA over questions of turf. The PLN did not want independent coops to be created and used as a vehicle of rural electrification. A compromise was finally arrived at whereby a non-coop approach was used for the densely populated island of Java, the area most desirable to the PLN. AID was allowed to try the coop approach in the less populated outer islands, where the PLN had less interest. ³²

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The project is described in USAID, "Indonesia--Rural Electrification I," No. 497-0267 (August 1977).

New Directions and central-station projects

AID's focus on central-system projects as opposed to autogenerators is partly a reflection of the philosophy of its rural-electrification contractor, NRECA. It also reflects New-Directions attitudes about infrastructure projects. ✓ Though unsympathetic to rural-electrification projects in general, New-Directions sentiment in Congress has been more sympathetic to such projects if they did not include generation. In its original form, for example, AID's Indonesian RE project included some diesel generators. Congress objected to the loan, and particularly the generators. AID let the generators go, knowing by that time that they would be picked up by the Canadians, who were also looking for something to finance in Indonesia.

Transmission and distribution in the countryside, then, tend to be looked at as more "New-Directionsy" than generation. This distinction does not seem an unreasonable way of selecting projects that get one closer to the rural poor. But the central-system grids of AID's RE programs are transmission-intensive compared to a set of independent autogenerators, which are generation-intensive. Thus it actually is not true that transmission can get one closer to the rural poor than generation, if one is talking about autogeneration as opposed to the generating plants that supply central systems.

Interestingly, the New-Directions distinction between generation and transmission gives even greater credence to the assumption that central-system grids are always better than autogenerators. It makes it easy to overlook one of the advantages of autogeneration. By requiring very little transmission and coordination of the various systems, as noted above, generation minimizes the demand for organizational and management skills that are scarce in recipient countries. Thus autogeneration may sometimes do better at getting electricity to the rural poor precisely because it is generation and is not transmission.

Piecemeal and lumpy investments

There is another reason that a set of independent generators supplying a region might be more economic than a central system. The system approach constitutes a lumpy, indivisible investment, compared to the town-by-town acquisition of independent generators. Because of the scarcity of capital in developing-country economies, a single investment at one moment of time is considerably more costly than stringing out these same expenditures through time. Towns, of course, can connect up one by one to a central rural system once it is in place. But the system is still a lumpier investment than growth by autogeneration, since the former requires a major investment in a transmission network and a minimum number of towns to start out with.

This lumpy-vs.-piecemeal distinction was actually first applied to the analysis of development projects also in the area of electric power, more than ten years ago.³³ IBRD research demonstrated that the economic comparison of hydro vs. thermal power projects, when based on the interest rates charges by donor institutions, gave an artificial edge to hydro projects. The hydro project has a greater initial capital cost than the equivalent thermal, while thermal has higher operating costs than hydro. If one uses the concessional interest rate on donor lending to discount the stream of costs and benefits of the two alternatives, the future operating costs of thermal are not discounted as heavily as they would be if the higher, real cost of capital were used. Using the real cost of capital, in contrast, gives greater relative weight to present costs (the lumpy investment in hydro) as opposed to future costs (the higher operating costs of thermal).

As in the case of thermal vs. hydro, independent autogenerator growth has an advantage over central-system projects in that it strings out the total costs of supplying electricity through time, instead of concentrating them in the present.

³³ IBRD, The Economic Choice between Hydroelectric and Thermal Power Developments, by Herman G. van der Tak, World Bank Staff Occasional Papers No. 1, 1966.

Actually, autogeneration is to central supply as thermal is to hydro in two ways: not only can the investment be strung out over time, town by town, but the operating costs for autogeneration are higher than those of a central RE supply.³⁴ Like thermal vs. hydro, then, autogeneration has lower present (capital) costs and higher future (operating) costs in comparison to central supply.

The piecemeal growth pattern of electricity supply through autogeneration has another advantage in a capital-scarce developing country. Autogeneration allows the demand potential of an area to become known before one has to make the major and irreversible investment involved in central-system supply. The planning of RE networks must be based to a great extent on projections of future demand and is subject to considerable uncertainty. It is not uncommon, for example, for an RE network to be in existence for 20 or 30 years before its capacity is fully utilized. The growth of electricity supply through separate autogeneration systems avoids these long periods of startup and excess capacity, so costly in capital-scarce countries. It also serves as an indication of existing demand and potential for future growth in a particular locality.

³⁴The World Bank shows typical operating costs of autogeneration at 12 times greater than those of grid-supplied projects. Total autogeneration costs are said to range from 9 to 20 cents per kwh or more (at 1972 oil prices), in comparison to total costs for public supplies of 4 to 18 cents (except in the case of widely scattered villages, where these costs will be two to three times greater.) IBRD, "Rural Electrification."

This makes the task of central RE projects easier, when they ultimately do come about, and lowers the likelihood of expensive mistakes resulting from inaccurate estimation of demand growth. Autogenerators are also suited to this demand-mapping and transitional role because their service lives are much shorter than those of the equipment in central RE systems—ten years vs. 30-40 years.

Autogeneration is typically criticized in AID loan papers for making power available only during certain periods—typically only at night. The proposed central-system supply, it is said, will have the advantage of providing electricity on a 24-hour, "full-service" basis.³⁵ The partial functioning of autogenerators, however, can also be seen as one of their "piecemeal", and therefore desirable, features. The 24-hour-service standard for AID projects, that is, is quite a rigorous one for many rural areas, and may be more than adequate.³⁶ After all, if use of electricity by the rural

³⁵ Both the Jordan and Indonesia RE papers refer to the fact that villages supplied with autogenerators have electricity only at night, citing this as a reason for the superiority of the proposed central-system supply.

³⁶ Some of the differences of opinion between NRECA and the Indonesian state power authority revolved around this type of issue. The Indonesians were accustomed to planning and designing on the assumption of partial supply and interruptions, as in the case of the limiters discussed above. NRECA, in contrast, wanted planning to be based on "full-service" thinking.

poor is pretty much limited to lighting, as shown by the impact studies, then not that much is being lost by supplying electricity only during the night hours.

The high investment in generation and transmission required for central-station RE systems makes it financially unwise to think of less than 24-hour service.³⁷ At the same time, the resulting high unit cost of rural electricity makes it impossible to set rates at levels high enough to cover these average costs--at least until the system is fully loaded up. The high operating costs of autogenerators, in contrast, mean there is some financial sense to supplying electricity only at moments of greatest demand. There is nothing to be gained, in contrast to central-system supply, by setting rates at less than costs. The economics of central-system rural electrification, in other words, carry an inherent bias toward the promotion of more electricity consumption, while those of autogeneration do not. The most compelling reason to promote greater electricity use under

³⁷ The World Bank estimates the average costs of rural-electrification projects as three to four times greater than those of urban projects. Not infrequently, moreover, the excess capacity in the rural systems will be enough to meet up to 20 years of growth in demand. As a result, it is typically recommended that rates be set at lower than unit costs--at least for the first five to 15 years of RE projects. IBRD, "Rural Electrification," pp. 54,59.

central-system supply, that is, may turn out to be the gain from more rapidly amortizing high-cost installed capacity--rather than the economic benefits of such expanded use to consumers or the impact on regional development. The "higher-priced" autogenerated electricity, then, may also reflect the real cost of rural electricity to the economy instead of just "inefficiency." And the sparer consumption opportunities available under autogeneration may sometimes fit better the needs of rural areas. ✓ Thus it can not be assumed that full-service supply is always more desirable than partial supply, given the considerably greater investment costs of the former and the fact that autogeneration may satisfy most of the needs of the rural poor for electricity in many rural areas.

The piecemeal development of rural electricity supply can economize on central-government finances. Communities with already-existing electricity supply are likely to mobilize efforts and finance when an opportunity presents itself to improve the quality of that supply and lower its price--i.e., when the possibility arises of hooking up to a central RE system. The community with autogenerated supply has the incentive of lowering the costs of something it already buys. The community with no electricity at all has less incentive to contribute to the installation of a service for which it will have to make new cash

outlays and whose advantages are not familiar. Not surprisingly, studies of village preferences have shown electricity to be of low priority to villages without it—in comparison to investments in health and water supply.³⁸

Development of rural electricity supply through autogeneration in sum, is likely to help mobilize support and capital for the next and much more costly stage of the process—central-system supply. This potential for mobilization of local interest in and financing for infrastructure projects is a strong argument in general for decentralization of decisionmaking and financing, as noted in the discussion of rural roads. Thus the piecemeal nature of autogeneration growth not only saves on scarce public capital and allows eventual RE systems to make more economic decisions about location and capacity. It also provides a significant opportunity for the mobilization of local capital for further stages of electrification—in a way that large lumpy investments, financed by the central government and from outside, do not.

The lumpiness of central RE systems is precisely what makes them desirable to AID as projects. Though lumpiness may be a costly way to use scarce resources in the recipient-country economy, it is at the same time a more efficient use of AID staff

³⁸ Ibid.

time than the piecemeal approach.³⁹ This efficiency relates not simply to dollars committed per unit of AID staff time, but also to the institutional feasibility of such projects for AID. With central-system rural electrification, AID has to deal with only one or two government authorities--and has a contracting organization at hand, NRECA, that is ready and able to do such projects anywhere in the world. The financing of independent generators, in contrast, could involve myriad local authorities and private entities--as well as going against the preferences and working habits of AID's rural-electrification contractor.

Conclusion

There may be ways of combining the efficiency for AID of the central-station approach and the efficiency for developing-country economies of the piecemeal approach. One possibility could be a central-government fund for local autogeneration projects or for hookups to central-station RE grids. The fund could be partly financed by AID and operated on a matching basis with the localities. This would

³⁹ Similarly, IBRD staff has noted that despite its correction of the pro-hydro bias in hydro-thermal cost comparisons, as described above, large hydro projects kept being approved at the same rate.

create a mechanism for tapping the potential that exists for local financing of and organization for such projects. Such a fund might eventually be expanded to include other projects for which localities are likely to put forth some effort--like roads, schools, clinics. The resulting decentralized decisionmaking of such an approach could have a significant impact on the rural poor--above and beyond the potential impacts of central-station RE projects. The New-Directions appeal of this approach would be the mechanism by which local projects were decided upon and funded, and not just the fact that one was financing an electrification, roads, or schools project.

One of the more successful aspects of AID's experience with rural electric cooperatives might also be applied to autogeneration. The DAI evaluation of NRECA's RE programs suggests that the coop approach can be good at setting up local organizations to generate and distribute their own electricity or to obtain a hookup to a central grid. In Latin America, however, RE coops did not seem to be able to supply power at prices that were competitive with those charged by the central state power authorities.⁴⁰ The latter were either already in existence at the time of AID's RE project, or came into existence during the course of the project. Though the evaluation reported these price discrepancies as contributing to the

⁴⁰ DAI, "An Evaluation of the Program Performance of the International Program Division of the NRECA." The study did not indicate whether the coops' costs were higher, as well as their prices.

"takeover" and "demise" of the coops by the state systems, this sequence of events could also be looked at in a positive way: the coop may have been a crucial first step toward getting the attention of the state system to serve these particular localities. If a more efficient entity came along and replaced the coop, this does not deny its important role in attracting a more efficient supplier to the town.

The role of the local coop in the sequence described above is complementary to that of autogeneration: it creates an organized group at the local level that will be able to pressure more effectively than previously for a hookup to the central system. The autogenerating coop's experience with its own electricity, or as part of a smaller system, will provide some track record of electricity demand for the larger power authority. The coop "phase", moreover, can take care of the task that is hardest for state power companies to do--organization for and carrying out of local distribution. The coop approach, then, could be applied to the creation of autogenerator systems, as the first step in a sequence of electrification growth. Later steps, if successfully taken, could well involve the withering away of the coop--as happened in the Latin American cases noted by DAI.

It should be clear by now that autogeneration and central-station systems are not being discussed here as mutually

exclusive alternatives. Each approach corresponds to a stage of electric power development. There is some argument for not skipping the autogeneration stage, however, as AID may be doing in some of its rural-electrification projects. There is good reason for AID to finance autogeneration, moreover, and not only just central-station systems. Finally, the justification for moving to central-station systems should be more rigorously made for AID's projects. This is because the move is costly and because the comparative costs of replacing existing autogenerators with RE systems have been underestimated.

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