

PD-ABD-467

ISA 74476

UNCLASSIFIED

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
Washington, D. C. 20523

BOLIVIA

PROJECT PAPER

ELECTRIFICATION FOR ALTERNATIVE DEVELOPMENT

AID/LAC/P-672

PROJECT NUMBER: 511-0614

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT <b>PROJECT DATA SHEET</b>				1. TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete		Amendment Number		DOCUMENT CODE <b>3</b>			
2. COUNTRY/ENTITY BOLIVIA/USAID				3. PROJECT NUMBER 511-0614							
4. BUREAU/OFFICE LATIN AMERICA & CARIBBEAN				5. PROJECT TITLE (maximum 40 characters) ELECTRIFICATION ALTERNATIVE DEVELOPMENT							
6. PROJECT ASSISTANCE COMPLETION DATE (FACD) MM DD YY 09 30 96				7. ESTIMATED DATE OF OBLIGATION (Under 'B' below, enter 1, 2, 3, or 4) A. Initial FY 91 B. Quarter 4 C. Final FY 94							
8. COSTS (\$000 OR EQUIVALENT \$1 = )											
A. FUNDING SOURCE		FIRST FY 91			LIFE OF PROJECT						
		B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total				
AID Appropriated Total											
(Grant)		( 940 )	( )	( 940 )	( 15,000 )	( )	( 15,000 )				
(Loan)		( )	( )	( )	( )	( )	( )				
Other U.S.	1.										
	2.										
Host Country						5,000	5,000				
Other Donor(s)											
<b>TOTALS</b>		940		940	15,000	5,000	20,000				
9. SCHEDULE OF AID FUNDING (\$000)											
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT			
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan		
(1) ESF	749	062				940		15,000			
(2)											
(3)											
(4)											
<b>TOTALS</b>						940		15,000			
10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each) 252      031								11. SECONDARY PURPOSE CODE 240			
12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)											
A. Code		BR		BL		PVOU		PVON			
B. Amount											
13. PROJECT PURPOSE (maximum 480 characters)											
<p>To create an appropriate, coordinated framework for effective rural electric policy, technology, finance and management and to demonstrate such policies with the construction of model rural electric systems, focusing in areas where such investments will directly support national coca reduction programs.</p>											
14. SCHEDULED EVALUATIONS						15. SOURCE/ORIGIN OF GOODS AND SERVICES					
Interim		MM	YY	MM	YY	Final	MM	YY			
				1 2	9 3		0 6	9 6			
						<input checked="" type="checkbox"/> 000 <input type="checkbox"/> 941 <input checked="" type="checkbox"/> Local <input type="checkbox"/> Other (Specify)					
16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.) The USAID Controller has reviewed the methods of implementation and financing and the financial procedures described herein and in the special provisions of the Cooperative Agreement, and hereby indicates concurrence. This project is proceeding using the Collaborative Assistance Method per Handbook 13, App.6B and the attached project paper-like document is subject to change pursuant to the use of that method.											
17. APPROVED BY						Signature <i>Garber A. Davidson</i> Garber A. Davidson A/Director				Date Signed MM DD YY 09 12 96	

*u*



**PROJECT AUTHORIZATION**

**Name of Country/Entity:** Bolivia

**Name of Project:** Electrification for Alternative Development

**Number of Project:** 511-0614

1. Pursuant to Sections 103 and 531 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Electrification for Alternative Development Project for Bolivia involving planned obligations of not to exceed \$15,000,000 in grant funds over a five year period from the date of authorization subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the Project. The planned life of the Project is approximately five years from the date of initial obligation, to September 30, 1996.

2. The Project purpose is to establish and demonstrate comprehensive implementation mechanisms for national level electrification planning, construction and sustainability in support of the Alternative Development strategy of the Government of Bolivia (GOB), together with direct investment support for selected Alternative Development projects and sub-strategies. The general objectives of the Project are to:

- Increase the number of target population receiving electricity;
- Expand the use of electricity in target areas for high-value agriculture, agro-processing and other rural industry, export-related activities, and in traditional economic activities in order to provide jobs and alleviate poverty, with particular emphasis on areas of alternative development.

-2-

- **Improve the operational standards of rural electric distribution through the application of new policies for the rational selection, design, and operation of rural electrification systems; and**
- **Provide a solid institutional base for the maintenance and expansion of rural electric generation and distribution entities.**

**The Project will have four major components:**

- **Technical assistance in system operations, administration, and maintenance to be provided to utilities in the Alternative Development target areas when required to improve their reliability of service to a level acceptable to potential productive use customers;**
- **Technical assistance and financing mechanisms for promotion of productive use programs in existing utilities aimed at increasing utilization of new or existing facilities;**
- **Identification in accordance with rational, objective criteria, design, and construction of new rural electrification projects in coordination with other development agencies to serve new customers; and**
- **Establishment and funding with seed capital of a cooperative rural electrification finance company capable of providing sustained on-going support to member utilities in the areas above**

c.

-3-

3. The Project will be carried out through a Cooperative Agreement with the National Rural Electric Cooperative Association, (NRECA), using the Collaborative Assistance Method described in AID Handbook 13, Chapter 6, Appendix 6B. The Collaborative Assistance Method gives substantial design and implementation authority and responsibility to the recipient of the Cooperative Agreement, NRECA, and to the Cooperating Country, Bolivia, through the active collaboration of these parties and USAID/Bolivia. The Project will proceed in stages, each being approved by USAID/Bolivia through the process of adding incremental funds to the Cooperative Agreement. The Government of Bolivia, NRECA and AID shall enter into a Memorandum of Understanding, or similar agreement, describing the terms and conditions for their cooperation in the Project.

4. The Project Agreement(s), which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with AID Regulations and Delegations of Authority, shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as AID may deem appropriate:

a. Source and Origin of Commodities, Nationality of Services

Commodities financed by AID under the project shall have their source and origin in the Cooperating Country or in the United States, except as AID may otherwise agree in writing. Except for ocean shipping, the suppliers of commodities or services shall have the Cooperating Country or the United States as their place of nationality, except as AID may otherwise agree in writing. Ocean shipping financed by AID under the Project shall, except as AID may otherwise agree in writing, be financed only on U.S. vessels of the United States.

-4-

b. Prior to obligations in excess of \$1,000,000 under the Project, AID and NRECA shall review and approve engineering, financial and other plans, including reasonably firm cost estimates for obligations of assistance in excess of \$1,000,000, and the USAID/Bolivia shall certify the capability of Bolivia, both as to financial and human resources, to effectively maintain capital assistance provided under the Project, as required by Section 611(a) and (c) of the Foreign Assistance Act.

c. Prior to obligation of any funds for demonstration sub-project activity requiring construction, or technical assistance associated with construction, an environmental assessment shall be conducted, which will examine the impacts of all sub-project activities, and provide specific construction guidelines, mitigation measures, and establish accountability and responsibility for ensuring that proper environmental procedures are implemented. Project evaluations will examine the success of the environmental review process in terms of minimizing any negative environmental impacts that may occur during project implementation.

#### 5. Authorization of Local Cost Financing

Based on the financial plan, the description of Project activities and implementation arrangements in NRECA Project Proposal, local cost financing with appropriated funds is hereby authorized for the Project, as necessary to fulfill program objectives and to best promote the objectives of the Foreign

Assistance Program. Per 90 State 410442, the Buy America Policy Guidance cable, para 12, the source, origin and nationality requirements of the Standard Provisions of the Cooperative Agreement will apply

*Carber A. Davidson*  
Carber A. Davidson  
Acting Director  
USAID/Bolivia

Date: 7/28/91

RLA:SCAllen:nec  
7/3/91

Clearances:  
PD&I: MBarash (in draft) Dated 7/11/91  
PD&I: MCheney (in draft) Dated 7/10/91  
PD&I: EKadunc (in draft) Dated 7/17/91  
ARD: DMcIntyre (in draft) Dated 7/22/91  
DP: SSmith (in draft) Dated 7/22/91  
EXO: LFoley (in draft) Dated 7/19/91  
RCO: CBucher  
CONT: TJohnstone

A/DD: RRosenberg

0159B

*SCA*  
RLA:SCAllen:nec  
7/3/91

Clearances:  
PD&I: EKadunc  
PD&I: MBarash  
PD&I: MCheney *MC 7/10/91*  
ARD: DMcIntyre  
DP: SSmith  
EXO: LFoley  
RCO: CBucher  
CONT: TJohnstone

A/DD: RRosenberg

0159B

*SCA*  
RLA:SCAllen:nec  
7/3/91

Clearances:  
PD&I: EKadunc *ZIK 7/17*  
PD&I: MBarash *MB 7/10/91*  
PD&I: MCheney *MC 7/10/91*  
ARD: DMcIntyre  
DP: SSmith  
EXO: LFoley  
RCO: CBucher  
CONT: TJohnstone

A/DD: RRosenberg

0159B

*SCA*  
RLA:SCAllen:nec  
7/3/91

Clearances:  
PD&I: EKadunc  
PD&I: MBarash  
PD&I: MCheney *MC 7/10/91*  
ARD: DMcIntyre *DM 7/22/91*  
DP: SSmith  
EXO: LFoley *LF 7/19/91*  
RCO: CBucher  
CONT: TJohnstone

A/DD: RRosenberg

0159B

4

ELECTRIFICATION FOR  
ALTERNATIVE DEVELOPMENT  
PROJECT



ALTERNATIVE DEVELOPMENT RURAL ELECTRIFICATION PROJECT

Submitted to:

The U.S. Agency for International Development/Bolivia

by:

The National Rural Electric Cooperative Association  
International Programs Division  
Washington, D.C.

JUNE 7, 1991

## TABLE OF CONTENTS

I.	Project Purpose and Description.....	1
	A. Project Overview .....	1
	B. Need for Infrastructure Improvement.....	2
	C. Need for Sustainability Support .....	4
II.	Background of Project .....	7
	A. USAID/Bolivia Goals .....	7
	B. Rural Electrification Projects Phase I - II .....	8
	1. Rural Electrification Projects Phase I .....	8
	2. Rural Electrification Project Phase II .....	9
	3. Conclusions on RE Phase I and II .....	11
	C. An Assessment of the RE Sector in Bolivia .....	12
	1. Planning and Coordination .....	12
	2. Financial Condition .....	14
	3. Personnel .....	15
	4. Materials and Construction Standards .....	16
	5. Licensing and Regulation .....	16
	6. Productive Uses .....	17
	7. Conclusions in the Bolivia R.E. Subsector .....	17
	D. Assessment of National Electric Energy Balance .....	19
III.	Project Analysis .....	21
	A. Alternative Benefit Outputs .....	21
	1. Intended Beneficiaries .....	21
	2. Intended Social and Economic Benefits .....	21
	3. Gender and Differential Socio-Economic Impacts.....	22
	4. Productive uses of Electricity .....	23
	B. Definition of Development Areas .....	26
	C. Description of Potential Development Areas .....	27
	1. Social and Economic Background .....	27
	2. Migration and its Relationship to the Alternative Development Area.....	29
	3. Other Areas .....	33
	D. Analysis of Existing Utility Condition .....	34
	E. Regional Priorities .....	35
	1. Alternate Development Areas .....	37
	2. Surrounding Areas of Migration .....	39
	3. High Potential Areas .....	39
IV.	Project Design and Implementation .....	41
	A. Productive Use Program .....	42
	B. Construction Activities .....	43
	C. Technical Assistance in System Operations .....	45
	D. EFER Formation .....	46
	E. Project Schedule .....	48

V.	Project Impact Analysis .....	50
	A. Relationship with AID/GOB Goals .....	50
	B. Environmental Issues .....	52
	1. Environmental Impacts of Distribution Project Construction and Productive Use of Electricity....	52
	2. Environmental Impact Due to Generation .....	54
	3. Site-specific Environmental Assessment Procedure..	55
	D. Impact on Woomen .....	55
VI.	Project Evaluation and Reporting .....	57
	A. Monitoring Plan .....	57
	B. Financial Reporting .....	59
VII.	Financial Plan .....	60
	A. Project Budget .....	60
	B. Non-AID Funding .....	61
	C. Linkages with Micro-Enterprise Development Program..	62
VIII.	Host Country Coordination .....	63
	A. Overview .....	63
	B. Coordination with the GOB Alternative Development Entities .....	64
	C. EFER Coordination Considerations .....	66
IX.	Statutory Issues .....	67

ANNEXES

ANNEX A:	Demand Assessment Model Methodology
ANNEX B:	Conceptual Design for Long Term Sustainability Support
ANNEX C:	Draft of Memorandum of Understanding
ANNEX D:	Logical Framework
ANNEX E:	Letter of Intent from ANALEC

## Alternative Development Rural Electrification Project

### I. PROJECT PURPOSE AND DESCRIPTION

#### A. Project Overview

NRECA proposes to establish a broad program of rural electrification (RE) support in Bolivia as part of the infrastructure development component of the GOB's Alternative Development Strategy. This support will consist of a combination of technical, management, and financial assistance that will address both short-term electrification investment targets of the strategy, and the longer-range sustainability needs of the rural electrification subsector in Bolivia.

The national goal to which this project contributes is the reduction of Bolivia's dependency on the coca economy by creating new economic opportunity. Intended beneficiaries are coca producers and impoverished populations which may otherwise be drawn into coca cultivation for economic survival. The overall project purpose is to establish and demonstrate comprehensive implementation mechanisms for rational rural electrification planning, construction and sustainability in support of the Government of Bolivia's Alternative Development strategy, together with direct investment support for selected Alternative Development projects. The general objectives related to this project purpose are to:

- o Increase the number of target population receiving electricity.
- o Expand the use of electricity in target areas for high-value agriculture, agro-processing and other rural industry, export-related activities, and in traditional economic activities in order to provide jobs and to alleviate poverty.
- o Improve the operational standards of rural electric distribution through the application of new policies for the rational selection, design, and operation of rural electrification projects.
- o Provide a solid institutional base for the maintenance and expansion of rural electric generation and distribution entities.

- o Leverage USAID's resources with effective donor coordination, and develop a sustained flow of investment to the rural electric subsector in Bolivia.

The agencies responsible for the GOB's Alternative Development program are not set up to play a strong technical coordinating and implementing role for the RE elements and admit the need for specialized assistance to identify priority RE investments and to help coordinate the implementation of these investments.

NRECA will provide this assistance through its Technical Assistance project activity. The NRECA team would assist in evaluating counterpart agency projects and/or would invite counterpart participation in projects identified by the NRECA team. In order to obtain maximum benefit, NRECA would act as executing agency for the project with whole or partial counterpart agency funding. In this fashion, AID RE construction funds authorized under this project may be effectively leveraged.

#### B. Need for Infrastructure Improvement

USAID is supporting the Government of Bolivia (GOB) in a campaign to reduce the production of coca leaf that feeds into international drug production and trafficking. Coca production in Bolivia is concentrated in a few remote areas, principally the Yungas in the La Paz Department and the Chapare region of Cochabamba Department. Labor for cultivation and processing of coca is drawn from the depressed areas of the high valleys of Cochabamba department and the altiplano of Potosi and Chuquisaca. The closing of the unprofitable state-owned mines in the Sucre and Potosi areas further stimulated migration to the coca growing regions. Processing of coca takes place in the remote Beni, so the areas affected by the coca trade are not limited to the places where it is cultivated.

A key element of GOB/USAID strategy is to develop alternative economic opportunity for rural populations who are being drawn into the drug economy for want of other means to produce income. The high financial return has made coca cultivation an attractive occupation and other traditional alternatives uncompetitive. Additionally, many parts of Bolivia have also been afflicted with severe drought during the 1980s, which has exacerbated the economic decline of these areas, especially the Altiplano/High Valley regions. Programs promoting crop substitution have been in place since the early 1980's, but early results of these programs indicated that even high value crop alternatives to coca could not, by themselves, compete with coca's income generating ability. The strategy is now changing to broaden the Alternative Development Program from one of crop substitution to more integrated economic development, including agro-industrial development, marketing and other assistance, and employment creation. This development

approach has proved effective in dealing with intractable poverty conditions in many countries; recent studies by the World Bank<sup>1</sup> have shown that this strategy has been successful at dealing with structural poverty, particularly of the landless poor. Such a strategy requires significant infrastructure inputs to complement investments in productive activities. The GOB and USAID are planning significant rural electrification investment as part of the overall strategy to contribute to the infrastructure development in this sub-sector.

According to statistics of INE (National Statistical Institute) 26% of rural Bolivian households have access to electricity. Even this low figure is misleading, considering it includes locations that have electricity on an occasional basis only (in many cases for as little as a few hours per day). Often, this is a function of the capacity and operating costs of local generation, which in most cases is the factor limiting expanded use of electric energy. Users are encouraged to use electricity only for lighting. Such electric service has little value for promoting productive uses and offers few measurable economic benefits. Electric service must be perceived as reliable, available on demand, and essentially limitless in quantity to gain the confidence of commercial and industrial users. Moreover, since economic development depends upon the development of productive activities, it follows that the Bolivian electric infrastructure must be improved before it can contribute in any significant way to alternative development.

The proposed project will aggressively address the shortcomings of previous infrastructure development projects with a comprehensive, innovative approach. A multi-disciplined team will be assembled to lay the groundwork for overhauling the subsector beginning with a regional analysis program using a rational system for project selection and design. The team's agenda will also include technical assistance for least-cost design for power supply and distribution construction, utility operations technical assistance and training, and demand-side assistance. This should promote complementary investments to accelerate the productive use of the delivered energy. These interventions will be applied directly in a short-term RE construction program under a number of Alternative Development initiatives, both USAID-financed and non-USAID. At the same time, a parallel effort will begin to build the institutional infrastructure for long-term sustainability of these investments. The centerpiece of this infrastructure improvement will be a private finance corporation with a charter and resources to deal with this subsector's specific needs.

The project will provide direct funding support for both the short-term construction effort and for the envisioned finance entity. The project will stress donor coordination in both components,

---

<sup>1</sup>1990 World Development Report, World Bank, Washington, D.C.

particularly for the RE finance company. Using the project's resources as seed equity and security for attracting other financial resources, up to \$20.0 million in external finance could be added to the project. Thus small increments of USAID investment through this mechanism can multiply the resources feeding into the Alternative Development strategy.

In evaluating the situation that exists in the rural electric sub-sector of Bolivia, it has become clear that the proposed approach is needed as a means of turning around the historically poor performance in this area. As efficient productive use of electricity in the rural areas is essential to successful alternative development goals of the GOB and USAID, the implementation of infrastructure improvements proposed in the project are well justified.

### C. Need for Sustainability Support

Deficiencies in performance of the rural electric subsector are largely a product of the lack of sustained support over the years since the USAID financed Phase I and II projects were completed in 1980. The Phase I and II projects were constructed and turned over to operating utilities, in some cases formed for the purpose of accepting the facilities, but these projects did not include a long term support component. This resulted in utilities incapable of operating systems in a fashion that would insure financial viability and technical reliability. Structural weaknesses in operations and management occurred in several of the newly formed utilities that have to date remained unresolved.

Previous studies of rural electrification projects in Bolivia, including USAID-financed projects, have identified some of the key weaknesses in the management and operation of these projects. They include the following:

- o Much of the existing RE investment in Bolivia is underutilized. Electricity demands which were anticipated when the systems were conceived were never realized. While failure to achieve demand projections is in part related to Bolivia's disastrous economic problems in the early 1980's, a failure on the part of the utilities to promote productive uses for rural electricity has resulted in electric use being limited principally to residential lighting. Electric system investments cannot possibly be recovered through revenue from the 15-30 kWh per month residential service common in rural Bolivia.
- o The funds for rural system development flow through the public sector to utilities that are generally not forced to fully recover capital costs; indeed many do not recover operating costs. The GOB is then forced to honor these obligations, but

like many developing countries unpaid debts have piled up with little chance of being paid. Consequently RE investment capital has been scarce during the past decade, and is now generally available only on a donation basis, and at very irregular intervals.

- o As a result of inadequate revenues from system operation, and a lack of capital for system upgrading and expansion, the technical and financial operation of many of the rural distribution systems is poor with substandard electric service quality, and deteriorating system conditions.
- o Construction standards used on some past projects have not provided the long life desirable for electric system components. This is particularly true of wood poles used in many systems. Untreated local species are sometimes installed with predictable consequences, and even ostensibly treated poles have a high rate of internal decay in some areas, due perhaps to inadequate quality control at the treatment plant.

No rural electrification program is going to succeed under these conditions. From the standpoint of the GOB's Alternative Development program, RE investments that will not promote productive uses and that deteriorate physically and financially over time while not providing regular, dependable service, will do little to attract new economic investment in agriculture or industry.

The utility industry is inherently a capital intensive one, with continuing needs for investment if service quality is to be maintained. In order for electricity to be affordable in the face of the high capital requirements of providing it, facility costs must be recovered over a long period of time. This implies that not only must facilities be long lasting, but that collection means must be similarly sustained. It is also a highly technical industry, with a continuous need for training and personnel development.

All of this points to a need for a philosophy of sustained investment in order to preserve gains made and encourage reliance by, and therefore growth of, the all-important productive sector. This philosophy has taken root in some utilities, but most Bolivian rural electric entities are operated on a philosophy which may be compared to the mining concept of depletion. Under this philosophy, a new facility (mine, electric plant, etc.) is operated at full output without further inputs until it is completely worn out and no longer fit for any use, at which time it is replaced with a new facility which is similarly operated. This philosophy may be appropriate for a mine with a finite body of ore, but it is not appropriate for an electric system which is to be an integral



part of an alternative development strategy. No productive use investment, and therefore, no alternative income generating strategy can depend upon such a haphazard approach to electric supply.

In an effort to improve the poor quality of service and reliability in existing RE investment, and to protect future investment made by AID and other donor agencies in RE, this project will address these shortcomings of the Bolivian rural electric subsector through establishment of a cooperative finance and service organization chartered to acquire long-term funding, assess project feasibility on a rational basis, and provide ongoing support services and training to member electric utilities. Initial funding would be through an AID grant of Project funds to be used as seed capital to leverage other donor financing and provide a basis for sustained support.

## II. BACKGROUND OF PROJECT

### A. USAID/Bolivia Goals

Though USAID/Bolivia has contributed to Rural Electrification (RE) in Bolivia in the past, it has allowed a decade to elapse with little or no activity on its part. Renewed interest stems from the broader goals of the war on drugs. More specifically, carefully selected RE projects are one of the USAID's objectives as an infrastructure component of the Alternative Development strategy.

The Alternative Development strategy in the USAID/Bolivia FY 1992-1993 Action Plan, states that "The United States' overarching goals in Bolivia are to support the democratic process, encourage policies leading to economic stability and growth, and drastically reduce production and trafficking of illegal coca and cocaine." USAID/Bolivia's contribution toward achieving these USG goals is manifested by support for the following five strategic objectives:

- o Sound Economic Policies
- o Alternative Development
- o Export Promotion
- o Maternal and Child Health
- o Strengthening Democracy.

In its November 1990 Paris Meeting, the Donor Consultative Group viewed with favor the GOB's Alternative Development Strategy. The emphasis has shifted from coca crop substitution to the broader issue of substitution of the illegal coca derivative economy.

"The GOB Alternative Development Strategy, prepared by a newly established interministerial coordinating unit (CONALID), is premised on recognition of the long-run deleterious distortions to Bolivia's economy and democratic system caused by dependency on cocaine production and export, and recognition that any program of Alternative Development has to take place within the context of law enforcement efforts and other actions envisioned under Cartagena agreements. The strategy contemplates the eradication of all coca currently used for illicit production of cocaine between 1990 and 1995," (Action Plan). The appeal of this strategy at the 1990 Paris Donors Meeting prompted additional pledges totaling \$200 million.

In this context USAID/Bolivia requested NRECA to submit a proposal for a new RE effort in Bolivia, based on the NRECA's experience both in Bolivia and around the world.

## B. Rural Electrification Projects Phase I - II

The Rural Electrification (RE) Phase I and II projects, based on a studies performed by NRECA, established rural electric cooperatives in several locations in Bolivia. Financed by USAID the purpose of these projects was to construct electric transmission, substation and distribution facilities. The projects included a commodity procurement program, technical assistance, and engineering consultant services.

Phase I was implemented in Santa Cruz through the Rural Electrification Cooperative (CRE) and in Cochabamba through Empresa de Luz y Fuerza Cochabamba, (ELFEC SAM). Phase II was implemented in Chuquisaca by the Sucre Electrification Cooperative S.A. (CESSA), in Potosi by the Potosi Electric Services (SEPSA), in Tarija by the Tarija Electric Services (SETAR). In La Paz the original executing authority was INER (National Rural Electrification Institute) but INER was replaced by the La Paz Rural Electric Cooperative (CORELPAZ) and the Yungas Electric Cooperative (CEY).

### 1. Rural Electrification Projects Phase I

The Rural Electrification Phase I was carried out under Loan Agreement 511-L/T-046, signed on October 23, 1973 for US\$ 10,800,000 and increased by US\$ 1,000,000 on October 25, 1974. Stanley Consultants, Inc., Consultores Asociados S.R.L. (CONSA) and Energia y Desarrollo S.A. (EDESA) provided Consultant services for both subprojects. I.C.E. a joint venture company from Bolivia, Peru and Panama was in charge of the substations and line construction for both sub projects.

The following description is for the Rural Electrification Phase I, Santa Cruz Sub Project:

640 Km	14.4/24.9 KV three-phase line
252 Km	14.4 KV single-phase line
210 Km	220/380 volt secondary line
86 Km	220/380 volt secondary underbuild
2,250	Street light installations (30 systems)
14,000	Interior house wiring installations

The following description is for the transmission lines and substations:

50 Km	69 KV line
1	10,000 KVA 10 KV-69 KV substation
1	15,000 KVA 10 KV-14.4/24.9 KV substation
1	5,000 KVA 69 KV-14.4/24.9 KV substation

Financial Data (Loan Agreement 511-L/T-046)

Original Cost

AID Loan	US\$ 11,800,000	71%
Local contribution	" 4,819,000	29%
	-----	----
TOTAL	US\$ 16,619,000	100%

Final Cost

AID Loan	US\$ 11,790,300	46%
Local contribution	" 14,094,000	54%
	-----	----
TOTAL	US\$ 25,884,300	100%

Sub Project Cost

<u>Company</u>	<u>Estimated</u>	<u>Final</u>	<u>% Change</u>
CRE	10,950,000	19,399,500	77.2%
ELFEC	5,669,000	6,484,800	14.4%
	-----	-----	-----
TOTAL	16,619,000	25,884,300	55.8%

2. Rural Electrification Project Phase II

Phase II, under Loan Agreement 511-T-049, was signed on September 12, 1974 for US\$9,500,000 with the local contribution of US\$3,365,000.

Stanley-CONSA-EDESA provided consulting services for CESSA, SEPSA, SETAR sub-projects, beginning the work in September, 1975 and ending in June 30, 1980 when ENDE assumed responsibility for the project. Lord-Electric Co. from Puerto Rico and E.I.A.L. from Bolivia were the contractors for the construction.

Compania Boliviana de Energia Electrica (COBEE) were the consultants for the La Paz sub-project (CORELPАЗ and CEY), but the contract with COBEE was terminated due to poor design. Consulting services were recontracted with Compania Sudamericana de Consultoria (SUDCON) until the contract ended in November 30, 1980. Beginning November 30, 1980 ENDE assumed full responsibility for construction supervision.

The La Paz sub-project construction was accomplished by the Compania Boliviana de Ingenieria (CBI)-CIER-ING.MAYO, under a contract signed on November 17, 1977. The work did not begin until March 1, 1979 and ended in November 1981.

Due to organizational failures of the original executing agency, Instituto Nacional de Electricidad Rural (INER), it was necessary to replace this company, and two new cooperatives were created, CORELPAZ for the Altiplano area and Rio Abajo, and CEY for the Yungas area.

The La Paz sub-project consisted of the expansion of electric service to the densely populated areas of the shores of Lake Titicaca, to the Los Yungas areas northeast of the city, and to the area of Rio Abajo south of La Paz. The sub-project funded the following:

- 350 Km of 14.4/24.9 KV three-phase distribution lines
- 55 Km of 14.4 KV single-phase distribution lines
- 50 Km of secondary underbuild
- 150 Km of secondary on secondary poles
- 3,367 KVA of distribution transformer capacity
- 10,100 service and meter installations
- 2,000 street light installations
- 50 Km of 66 KV transmission line
- 8,500 KVA of 69 KV to 14.4/24.9 KV substation capacity.

This sub-project consisted of the construction of a principal distribution line between the city of Sucre and the towns of Padilla to the east and Mamahuasi to the northwest, in the department of Chuquisaca. The sub-project funded the following:

- 225 Km of 14.4/24.9 KV three phase distribution lines
- 35 Km of 14.4 KV single-phase distribution lines
- 30 Km of secondary underbuild
- 75 Km of secondary on secondary poles
- 1,760 KVA of distribution transformer capacity
- 5,280 service and meter installations
- 2,640 interior house wiring installations
- 1,500 street light installations
- 7,500 KVA of 69 KV to 14.4/24.9 KV substation capacity.

The SEPSA sub-project consisted of distribution lines in two areas between Betanzos and Esquiri-Rancho to the southeast of the city of Potosi and the area of Camargo.

- 205 Km of 14.4/24.9 KV three phase distribution lines
- 30 Km of 14.4 KV single-phase distribution lines
- 30 Km of secondary underbuild
- 70 Km of secondary on secondary poles
- 1,617 KVA of distribution transformer capacity
- 4,850 service and meter installations
- 2,425 interior house wiring installations
- 1,250 street light installations
- 7,500 KVA of 69 KV to 14.4/24.9 KV substation capacity.

The SETAR Sub-project was the most ambitious of the three southern province sub-projects and included two separate undertakings: (1) extension of electric service to the rural areas immediately adjacent to the city of Tarija to the north, south, and east, and (2) initiation of these services in the area to the north and south of the town of Villa Montes. The sub-project funded the following:

250 Km of 14.4/24.9 KV three phase distribution lines  
 40 Km of 14.4 KV single-phase distribution lines  
 50 Km of secondary underbuild  
 135 Km of secondary on secondary poles  
 3,044 KVA of distribution transformer capacity  
 9,130 service and meter installations  
 4,565 interior house wiring installations  
 1,250 street light installations  
 20,000 KVA of 69 KV to 14.4/24.9 KV substation capacity.

Financial Data (Loan Agreement 511-T-049)

Original Cost

AID Loan	US\$	9,500,000	74%
Local contribution	"	3,365,000	26%
		-----	----
TOTAL	US\$	12,865,000	100%

Final Cost

AID Loan	US\$	9,398,000	69%
Local Contribution	"	4,289,000	31%
		-----	----
TOTAL	US\$	13,687,000	100%

Sub Project Cost

<u>Company</u>	<u>Estimated</u>	<u>Actual</u>	<u>% Change</u>
CESSA	2,576,000	2,676,000	3.9%
SEPSA	2,308,000	2,331,000	1.0%
SETAR	3,691,000	3,522,000	-4.6%
CORELPAZ-CEY	4,290,000	5,158,000	20.2%
	-----	-----	-----
TOTAL	12,865,000	13,687,000	6.4%

### 3. Conclusions on RE Phase I and II

RE Phases I and II were the most ambitious efforts ever undertaken to extend the benefits of urban life to the rural population in Bolivia. The projects achieved their goals, but many important lessons were learned.

- o Line construction in Bolivia is difficult, resulting in higher costs than expected. RE I and II exceeded cost estimates by 34%.
- o Demand for local materials such as poles greatly exceeded the ability of the local market to supply high quality stock. Due to a scarcity of material, poorly seasoned, poorly treated poles were accepted for some original construction. This has resulted in shorter than expected lives for some poles in subtropical project zones, due to premature ground line rot.
- o Capabilities of local consulting engineers and contractors were over-estimated, requiring involvement by foreign companies who were both expensive and inexperienced in the area.

Future projects must be carefully measured and sized against local capabilities. Continuing technical support for inspection of local manufacturers of critical materials, such as poles is imperative, as is a more measured approach to project development. A sustained annual investment strategy covering a modest system expansion plan is far preferable to a large injection of capital over a short period followed by years of neglect.

#### C. An Assessment of the RE Sector in Bolivia

The energy sector in Bolivia is overseen by the Ministry of Energy and Hydrocarbons (MEH), with more specific responsibility for electricity delegated to the National Electricity Directorate (DINE), and the National Electric Utility (ENDE). At a glance this may seem straightforward, but these are only three of the more than 35 institutions that have, to a greater or lesser extent, made excursions into the field of rural electrification. Entities representing the central government, the Regional Development Corporations, public and private utilities, cooperatives, NGOs, and private entrepreneurs have all involved themselves to greater or lesser extent with varying degrees of effectiveness.

##### 1. Planning and Coordination

The Bolivian electric industry is regulated by the National Electricity Directorate (DINE), an agency of the Ministry of Energy and Hydrocarbons (MEH). This agency is charged with monitoring

system planning and routine administration of the utilities as well as regulating tariffs. The agency has a small staff and in practice, only COBEE, the private utility serving La Paz, receives much attention. As a consequence of DINE's limited staff, utility tariff requests take a long time to process, periods of up to a year being typical. Tariffs are established at levels considered acceptable by the government but in many cases do not allow full cost recovery. In reality, only utilities with large urban loads have been able to establish and maintain solvent financial positions. These utilities use the profits of urban revenues to subsidize continuing rural service and are reluctant to undertake further rural electrification due to concerns about profitability. Utilities serving predominantly rural loads have been unable to pay off the loans made to them under the previous projects.

Though the responsibility for nationwide power planning rests on ENDE, other agencies have been delegated the responsibility to promote rural energy to include electrification. Initially the Instituto Nacional de Electrificación (INER) was established to provide planning and coordination assistance for RE entities. After its dissolution the Comisión de Fomento Energético Rural (COFER) was formed to provide nearly identical services. Yet again, COFER is being dismantled and is being replaced, at least in part, by a new entity, the Dirección de Fomento de Energía Rural (DIFER). The problems that have plagued these organizations include a lack of the personnel, skills, and funding needed to carry out their mandate.

Electric cooperatives are also nominally regulated by INALCO, the National Cooperative Institute. However, INALCO was never intended to regulate electric utility operations, only ensure compliance with the Law of Cooperatives. In practice, however, INALCO functions are limited by a lack of resources. It therefore appears that, even though there are a number of agencies who technically have responsibility for one portion or another of the electric supply industry, in reality there is no effective oversight or support of rural electric utility operations.

With over 35 institutions (each with their own agenda, for the most part) involved in RE in Bolivia it is easy to understand why there has been inadequate coordination. Planning and implementation of RE projects in Bolivia over the past decade have suffered from extremes, from limited application of acceptable practices to widespread chaos. Given the chaos it is a tribute to the utilities and cooperatives that they have managed to survive and continue to supply electricity at all. Adding to the chaotic situation, both governmental institutions and NGOs have built RE networks without consulting the electric system to which they planned to connect.



In summary, the absence of an overall policy of development, virtually non-existent coordination, and lack of a thorough supervision mechanism, has resulted in a largely failed program of RE investment on both, financial, economic, and institutional levels.

## 2. Financial Condition

In order to assess preliminarily the conditions of the Bolivian RE sector utilities, annual reports were obtained where available from the electric utilities that were beneficiaries of RE I and II. Analysis of annual reports is an inexact science, subject to a high degree of individual interpretation and often depending as much on what is missing as what is presented. Therefore, while the following discussion is the result of a quantitative analysis, it by no means should be considered definitive. One particularly misleading aspect of the Bolivian utility annual reports is that system assets are in all cases revalued annually to correct for inflation. This practice tends to artificially increase book value of equity. Moreover, some of the financial statements reviewed, were not audited throwing into question the objective validity of the data presented in these reports.

### ELFEO (Oruro)

ELFEO's annual report was audited, increasing confidence in the data presented. The current ratio of 2.39 is adequate for normal operations. Equity level (corrected to discount the effects of revaluation) is 37%, in contrast to the reported revalued level of 87%. Cash position is weak even though operating margins appear reasonable.

### CRE (Santa Cruz)

CRE's current ratio of 2.03 is marginal and the 1989 operating deficit indicates a rate increase may be required. CRE's equity level corrected for revaluation distortions is 29%. While financial position is acceptable at present, future problems may be indicated.

### CESSA (Sucre)

CESSA's annual report was not audited, but problems are evident in any case. Corrected equity level is about 15%, which is very low. Cash reserves are small making CESSA's cash flow position very vulnerable.

#### SEPSA (Potosi)

SEPSA's annual report was not audited, and some questions are apparent. While the current ratio is a strong 3.22, cash position is weak which is contradictory. Much of SEPSA's income comes from non-utility operations, which is unusual. Corrected equity level is 31%.

#### ELFEC (Cochabamba)

ELFEC is in a very strong financial position with an equity level (corrected) of 69% and a current ratio of 4.41. Rural activities resulted in a loss of \$850,000 versus a profit of \$2,500,000 on urban service.

#### CEY (Yungas)

CEY has not prepared an annual report in many years and the current accountant has advised that considering the state of the cooperative books, he has no intention of preparing any for the years preceding 1991. CEY has not paid on any of its RE II loans, and has a significant past due power bill with its power supplier, as well as owing back taxes on employee salary withholding.

#### CORELPAZ (Huarina-Altiplano)

CORELPAZ, like CEY has not published annual reports in years and is believed to be in a similar financial condition.

One may conclude from the above that the financial condition of utilities in Bolivia varies tremendously. As noted, basically urban utilities such as ELFEC and to a lesser extent, CRE, can recover costs while wholly rural utilities like CORELPAZ and CEY have experienced serious financial difficulties.

CESSA and SEPSA, serving both the impoverished rural Altiplano and the small cities of Sucre and Potosi, are in intermediate financial positions.

### 3. Personnel

Even when financing and credit have been available for RE in Bolivia the lack of personnel with adequate training and experience has been a limiting factor. Specifically in the RE sector, as personnel receive training and gain experience they flow from the lower paying jobs, common to small rural electric cooperatives and GOB positions, toward more attractive jobs. Ironically, the very organizations whose intent it is to improve the situation, such as the IDB, UNDP, USAID, and the World Bank, often become the magnets for the most highly qualified personnel.

Thus GOB institutions often lack competent, motivated staff, and on the regional and local level rural electric entities responsible for developing and operating distribution systems encounter substantial difficulties in finding the staff needed to build, operate, and maintain their systems. Of the few existing training programs in the power sector, none are tailored to the needs of rural grid or isolated rural electrification projects and the users they serve. These circumstances have resulted in a shortage of medium-level technicians, and a total absence of trained promotional personnel.

#### 4. Materials and Construction Standards

Even though construction is claimed to follow the technical guidelines of the Rural Electrification Administration in the U.S., in reality, standards are not being applied for rural electrification in Bolivia. This applies to both evaluation methodologies and construction. To date, no effort has been made to establish and implement standards to apply to all RE projects. Where foreign financing has been provided RE projects have usually been subjected to more thorough evaluation and supervision. But even this has had its drawbacks. The proliferation of RE projects funded by German, Swiss, Italian, Japanese, and US agencies have introduced an uneven mix of equipment and standards from each agency. This combined with the often inadequately designed and short-lived locally-financed systems, saddles Bolivian engineers and administrators with the inevitable nightmare of designing system interconnections, and operation and maintenance programs, as project boundaries meet.

Due to the sporadic nature of utility construction in Bolivia, there has not been an opportunity to develop and sustain a local market for quality components such as wood poles and crossarms. During periods of high demand, such as during RE I and II construction, local producers can sell anything they make, and quality control is discarded. During periods of low demand, quality control is unaffordable. The result is that the quality of wood materials used in RE is very poor, as evidenced by the problems with treated eucalyptus poles supplied under RE II contracts. The mere publication of standards and specifications is not enough. A concentrated technical assistance effort and vigilance, as well as careful matching of contracts to capabilities will be required.

#### 5. Licensing and Regulation

Electric cooperatives obtain legal status by registering with INALCO, the national institute of cooperatives. However, INALCO does not have the capability to effectively regulate the RE industry. At one time INALCO affiliates were granted exemption from import duties on foreign equipment, but it is uncertain these benefits are still provided. Regulation of the power industry

falls mainly to DINE as governed by the Electric Code of 1968. The Code has had few changes since it was drafted and is in need of an overhaul. Perhaps the most significant responsibility assigned to DINE is that of tariff regulation. As discussed earlier the process of new tariff approval is sluggish adding to the complications faced by RE systems.

#### 6. Productive Uses

Perhaps one of the most significant problems facing RE entities is the relatively low line loading caused by a combination of two factors: low population density and lack of productive uses of electricity. In most rural areas where electricity is available it is used primarily for residential lighting and entertainment (radios, sound systems, and televisions). This consumption pattern is typical where people are largely unaware of how electricity can be used in productive activities. As RE projects encountered budget limitations, the Productive Uses Promotion activities were often the first to be cut, directly undermining long term sustainability.

Yet, productive uses are tantamount to insuring the survival of an RE system. Productive uses create income generation, but without sufficient economic activity, customers cannot afford electric service, and future growth through increases in economic productivity will not occur.

#### 7. Conclusions in the Bolivia R.E. Subsector

In 1989 and 1990, NRECA teams visited Bolivia to assess conditions in the rural electrification subsector. Following their investigation, a workshop was hosted by NRECA in August 1990 in La Paz to discuss the results and explore ways to mitigate perceived shortcomings. The workshop was attended by representatives of the electric power distributing entities in Bolivia, as well as government and development agency officials. The principal problems identified by the workshop and the investigative team may be summarized as follows, in roughly descending order of priority.

- a) Tariff levels are inadequate to recover the costs of the facilities, making the subsector dependent upon grant financing. In the case of some small systems, tariffs do not even recover operation and maintenance expenses, requiring continuing subsidies.
- b) There is no continuing national presence in the field to provide technical, managerial, or commercial training and auditing. Lack of administrative and technical skills has resulted in system losses of nearly 20% in one large electric cooperative. In the same cooperative, the 1988 annual report of system operations has not yet been completed.

- c) There are essentially no active productive uses promotion programs for the rural sub sector, resulting in use of electricity principally for residential lighting. Average rural energy use is very low, on the order of 30 kwh/month in some areas. No reasonable tariff can recover facility costs with such low usages.
- d) In many cases construction standards are either non-existent or not enforced, resulting in short useful lives for some critical system components.
- e) In many areas there is no financing for customer connection costs, slowing load growth in areas already electrified, resulting in low system utilization.
- f) There is erratic availability of financing for system improvements.
- g) There is generally no consistent project feasibility assessment method, resulting in less than optimum application of scarce resources.

It is clear that to consider expansion of efforts in the rural sector, care must be taken to focus on correcting those things that inhibit the development. Some utilities with rural loads are very professionally run, such as CRE in Santa Cruz and ELFEC in Cochabamba, but as noted, these utilities have a large base of urban load. Many rural systems are trapped in the spiral of poor service and high costs, which limit load growth, resulting in further reductions in revenue and consequent cutbacks in service. From lessons learned from the past, plus a productive uses focus, future RE efforts can avoid the pitfalls such as described here.

#### D. Assessment of National Electric Energy Balance

The National Interconnected System consists of 452 MW of combined hydroelectric and thermal capacity, interconnected by over 2,525 km of high tension transmission line. The system is largely hydro based, but due to the nature of the relatively small watersheds, strategic storage is minimal.

Demand has grown for the past decade at an average rate of six percent per year. This growth rate, largely due to the accelerating economic recovery, will necessitate the addition of over 1000 MW in the next twenty years. ENDE will address these capacity requirements largely through investments in simple cycle combustion turbines (880 MW). Relatively minor investments will also be made in additional hydroelectric capacity (297 MW).

There is a pressing need to address capacity shortfalls at present, however. ENDE has been at capacity, operating with marginal reserves for over a year. With the addition of the new combustion turbines, the system will still have insufficient reserve margins to contend with forced outages of any of its major generating facilities.

In recent months, load shedding has been practiced due to low levels of flow at the hydroelectric facilities. Taken in the context of an aggressive construction program, advocating thousands of new connections and accelerating demand for electricity beyond current projections, this could be cause for alarm. A strategy to address capacity requirements, maintaining the ability to provide sufficient power and energy to growth areas is required.

In all probability, this will require a multi-faceted strategy to both augment supply and to levelize demand. Programs to encourage energy conservation and load management would be highly advisable in urban areas. Programs to ensure that new subscribers install energy efficient devices will also be of paramount importance.

Typically, demand-side management programs are the most capital efficient means of providing "additional" capacity. By shifting loads to reduce system peaks, and through aggressive promotional campaigns to promote energy conservation, significant savings can be accrued that may result in lower expenditures for new capacity, more efficient utilization of capital assets, and overall enhanced utility performance.

During the power shortages of 1990, ENDE performed a residential energy use survey in the Cochabamba area. Sample size was 850, about 1% of ELFEC's urban residential customers. The study determined that residential demand accounted for over two thirds of ELFEC's evening peak, with over half of residential of residential peak demand accounted for by lighting. Inefficient incandescent lighting accounted for 88% of all installed lamps, with 75 and 100 watt bulbs most commonly used. ELFEC estimated lighting accounted for 21 MW of its system peak, approximately 33% of total demand.

Demand side management programs have been used very successfully in the United States, and are on the rise in developing countries. ELFEC has expressed a strong interest in accessing technical assistance to develop an energy conservation/load management program. Other utilities will likely follow the ELFEC lead, especially as supply becomes more limited with time.

In addition to a focus on demand side management, it will be necessary to identify and finance generation projects in addition to those sponsored by the central government. One possibility for ADREP will be to investigate and perhaps rehabilitate abandoned hydroelectric sites. These sites were discarded several years ago when the mining facilities for which they provided power ceased

operations. Most of the plants are over sixty years old, and are in need of complete rehabilitation. But, with capacity at such a low level as it is at present, these sites could play a relevant role in the generation picture.

Table II-1 below provides a list of the hydroelectric plants and their characteristics.

Table II-1. Hydroelectric Mining Plants			
Name	Capacity KW	Energy Produced (MWh)	Potential Additional Capacity (kW)
Killpani	2,670	39,000	0
Landara	2,200	13,700	4,500
Punutuna	2,500	18,000	2,700
Lupi-Lupi	2,640	13,000	0
Rea-Rea	1,800	9,100	3,500
Caracoles	1,100	7,471	2,200
Viloco	330	3,550	0

Data from 1990, COMIBOL.

Killpani, Landara, and Funutuna are plants in series along the Rio Yura. All plants listed were operating in 1990 and all except Caracoles and Viloco are connected to the national grid. The mines served by Caracoles and Viloco are now closed and the plants completely shut down.

The five plants connected to the grid have been offered to COBEE on a lease basis, but COBEE has indicated after a detailed analysis that the capacities involved are too small to be of interest. A factor in COBEE's decision is the nature of control systems of the plants, which are completely manual. Plants as small as these can be economically viable power sources when fully automated to eliminate the need for fulltime staffing.

### III. PROJECT ANALYSIS

#### A. Alternative Benefit Outputs

##### 1. Intended Beneficiaries

The Alternative Development Program is intended to promote equitable economic opportunity for men and women who have worked or are likely to work in the illegal cocaine industry, and for Bolivians in general by replacing lost foreign exchange earnings, income and employment. The ADP is also aimed at diversification of the export base of Bolivia, and meeting the basic needs of the poorest of the population. Sustained economic growth, and a transition from a cocaine-led economy to one with stable and diversified economic growth, are further goals.

The target groups for U.S. Government assistance have been expanded from men and women directly involved in coca cultivation and illegal cocaine processing, to the chronically and seasonally unemployed, as well as the underemployed population that is a potential source of replacement labor. All project activities focus on increasing income generation through a number of related mechanisms. These include strategies to attract domestic entrepreneurs and international investors to increase investment for export. In addition balance of payments support, rural roads, electrification, export promotion and micro enterprise development will be provided in the Alternative Development Area (ADA) and throughout the country to achieve program goals.

##### 2. Intended Social and Economic Benefits

In addition to the financial benefits of electrification measured in terms of revenues to the utility, there are additional economic benefits which electricity provides but which are not paid for by electricity users. These benefits are referred to, in economic terminology as the consumer's or producer's "surplus". As an example, for producers there are benefits of electricity use in terms of lower production cost, increased product quality, and increased output versus other fuels. Alternatively for electric lighting versus other lighting sources, there are benefits of lower cost, higher quality and increased lighting levels.

For households, the consumers surplus is difficult to measure, since no product is usually produced and sold. Estimates are possible however, and will be included in NRECA DAM benefit-cost assessment methodology for selecting project construction sites. Estimates of consumer's surplus can be derived from studies in El Salvador. A recent World Bank study estimated benefits additional to what was actually being paid to be about 100%. Estimates of productive users benefits are estimated for Bolivia based on



Guatemala data collected by NRECA, and are given in Table III-1 below. In the World Bank study, estimates were also made for producers surplus and range from 30-160% over the amount actually paid.

In addition to the above benefits which may be directly estimated and incorporated in the analysis, there are social and other benefits which are not normally quantifiable. Particularly relevant to this study are the benefits which might be derived from creation of new productive enterprises in which the net profit of the enterprise would be considered to be the quantifiable economic benefit, and where employment and possible impact on migration are also related benefits. Benefits may also include improved quality of life, improved economic opportunity or improved health and safety. For the household, benefits of electricity may be improved illumination, additional time for study by students, decreased effort for food preparation, reduced effort (e.g. electric irons), additional or lower cost entertainment (e.g. radio, cassette players, television), and possibly increased economic opportunities (e.g. electric sewing machines, blenders, corn grinders).

At the community level, electricity may be used to provide potable water by pumping or purification, provide for extended hours for education and improve the environment for daytime learning, improve communication for education or municipal government purposes, improve security by providing street lighting, and improve local health service by providing storage for medical purposes (e.g. vaccine storage and sterilization and instruments). Small commercial and industry benefits are usually well-captured in the quantification of surplus benefits above, but may also include health, safety or other benefits which are not quantifiable.

### 3. Gender and Differential Socio-Economic Impacts

Differential impacts on various socio-economic and gender groups are also important to consider. For the household this may include such impacts as electricity being initially affordable only by higher-income users who therefore benefit more from donor or government support; or geographic areas with greater income or productive potential receiving preference in order to increase project financial return. The ADREP will be implemented with specific components designed to minimize such effects. However, it is important to note that the appropriate response to these issues is more likely an overall government redistribution or tax policy, not distortion of the individual project design which might result in lower overall economic benefit to the economy.

Another aspect of project impact, with corresponding importance to design, is differential gender impact. For example, if one examines new electricity supply to the household, the actual use characteristics by gender group determine the impact, not the overall usage. For this reason, additional analysis of the hours

spent within the household by gender, type of activity engaged in and electricity use, are important in order to determine impact. In gender terms, electricity used to ease burdens of household work is an example of social benefit for females, while increased hours of work may be a social cost, and improved illumination a neutral result. It has been noted on the negative side, however, that electricity may help women to reduce the drudgery of laborious tasks but in the process extend working hours and not result in increased leisure time.

#### 4. Productive uses of Electricity

One of the main factors which differentiates the ADREP from past rural electrification efforts in Bolivia, will be a strong productive uses component. Examples range from a electricity powered sewing machine in a private house to electric motor-driven industrial applications. The definition of "productive uses of electricity" is:

"Any use of electricity that increases the end-users' economic status by facilitating production level increases, production cost savings, and/or increased product quality."

The most extensive review of productive uses for electricity in Bolivia was undertaken by the World Bank in collaboration with an NRECA team in 1990. The study evaluated the potential electricity demand from a combination of existing productive energy uses converting to electricity and new uses for the Asunta Valley in the Yungas of Bolivia. Individual communities were visited and prospects for growth of different economic sectors evaluated, for activities based first on the local economy, export oriented markets, and last, transport related activities. New productive use activities were identified for each area based on experience for similar areas with electricity, based on local resource base and prospective markets, and based on knowledge of development or private plans. A detailed description of the analysis conducted, as an illustration of the manner in which ADREP will assess economic feasibility before construction, is provided in Annex A.

Table III-1  
**POTENTIAL PRODUCTIVE END-USES**  
**Consumption Characteristic and Economic Benefit \*\*\***

Productive Use	Consumption kWh/month	Economic Benefit US\$/month
Essential Oils Plant*	3,000	732.72
Cashew Plant*	3,200	151.38
Rice Agro-industry*	6,400	279.94
Cocoa Agro-industry*	1,600	72.10
Fruit Agro-Industry*	8,000	349.22
Animal Feed (mill and mixer)*	513	25.03
Cement Product Factory *	8,300	362.21
Sawmill*	8,300	362.21
Coffee Mill*	5,000	219.32
Grain Mill**	175	20.66
Butcher's Shop**	240	13.21
Carpentry (large)*	200	11.48
Carpentry (small)**	100	24.94
Movie Theater*	85	6.50
Video Showroom**	20	47.98
Small Canning Plant*	100	7.15
Coffee Pulper**	46	24.25
Poultry Farm*	171	10.22
Ice Cream Parlor*	700	33.13
Health Clinic**	700	212.35
Medium Size Hotel**	650	76.25
Brick Factory*	20	33.13
Tire Repair Shop*	145	9.10
"Mayachasita"***	400	136.40
Mine (large)*	6,080	266.08
Mine (Medium size)**	1,525	443.86
Small Office**	80	90.43
Hair Dresser Shop*	32	3.97
Dairy Processing Plant*	60	5.42
Radio Station*	4,000	176.02
Tailor Shop**	45	16.95
Gas Station*	153	9.44
Electronic Repair Shop*	33	4.03
Welding Shop (large)*	1,300	59.11
Welding Shop (small)*	650	30.96
Large Store**	180	30.00
Small Store**	72	15.59
Public Lighting	700	33.33

\* Denotes new activity.

\*\* An existing but not necessarily electrified activity.

\*\*\* Though usage will fluctuate throughout the year for some productive uses, figures presented reflect annual consumption divided over 12 months.

The NRECA team also provided information regarding the number and type of commercial enterprises in a "typical" village in the Altiplano. Huarina has a total of 294 consumers. Data are presented in Table III-2. In this case, a total of 21 activities used 2,400 kWh per month.

TABLE III-2  
COMMERCIAL ACTIVITIES IN  
HUARINA, LA PAZ DEPARTMENT, BOLIVIA<sup>2</sup>

NUMBER	ACTIVITY	kWh/Month
1	Health Post	52
2	Ice-Cream making	275
1	Gas Station	266
1	Tire Repair	106
1	Hostel	107
1	Sewing Shop	50
1	Church	230
2	Bakery	91
1	Telecommunications Center	N/A
1	City Hall/Office	38
1	IBTA Facility	190
8	Stores	80

<sup>2</sup>. Ron Orozco, "CONSULTANT'S FINAL REPORT ANALYSIS OF PRODUCTIVE USES OF ELECTRICITY IN BOLIVIA," for WORLD BANK, Energy Sector Assistance Program, January 1990.

<sup>3</sup>. Based on consultant's visit to the area in August, 1989.

## B. Definition of Development Areas

Bolivia is divided into nine political departments which have diverse social, cultural, economic and physical characteristics. The departments are normally grouped into three physical areas sharing climatological and geological characteristics--the Altiplano, the Valles, and the Tropicos.

### Departments by Region:

Altiplano	La Paz Oruro Potosi
Valles	Cochabamba Chuquisaca Tarija
Tropicos	Santa Cruz Beni Pando

For the purposes of the Cochabamba Regional Development Project, the term Alternative Development Area was used to encompass the focus area of the project. At the time the project paper was written, this included only Cochabamba Department, but consideration was being given to expanding the area to include other regions which produced coca, or contributed labor to cultivation or processing. This includes the Yungas and Asunta valleys in La Paz Department, and the impoverished northern regions of Chuquisaca and Potosi departments.

NRECA feels that it is important to consider those areas which have significant development potential as well, since these areas can form a focus for migration away from the coca growing regions. Investment in such areas may well provide a greater development return than investment in the more traditional high valley regions where improvements will be at best incremental. High potential areas have the additional benefit that development can more easily be focused away from survival issues and toward export and other market oriented activities which will benefit overall national foreign exchange conditions. Factors which qualify an area as "high potential" include such physical items as availability of water for agriculture, climate, landholding patterns, existence of infrastructure such as roads, etc., as well as intangibles such as past development success, and energy or entrepreneurial spirit on the part of the people. Such attributes are normally found in the areas most recently opened to colonization. In Bolivia this includes the Beni and Santa Cruz departments. The Beni is part of the Amazon basin and is environmentally sensitive, as well having a general lack of infrastructure. For this reason it is not

considered a good candidate for ADREP activities. The Santa Cruz department on the other hand combines most of the necessary attributes of a high-potential area, with reasonably good infrastructure. It is also adjacent to the Chapare coca growing region, making migration out of the coca region feasible. For these reasons, Santa Cruz has been added to the list of areas to be evaluated for ADREP activities.

The areas which will be considered part of the ADREP area of interest are defined as follows:

- (1) Alternative Development Areas (from CORDEP)
  - a. Chapare (including parts of other provinces)
  - b. Associated High Valleys of Cochabamba Dept.
  - c. Yungas/Asunta Valley
- (2) Surrounding Areas of Migration (Chuquisaca/Potosi)
- (3) High Potential areas in western Santa Cruz department

#### C. Description of Potential Development Areas.

##### 1. Social and Economic Background

Bolivia has a population of about 7,300,000 persons, with 51% of the population in urban areas with greater than 2,000 persons. Of the rural population about 50% live in the Altiplano (19% of land area) the Valles contain over 30% of the rural population (12% of land area), and the Tropicos have only 17% of the rural population (and 69% of land area).

Per capita income in Bolivia is the lowest in South America, with both infant mortality and unemployment high, and literacy and economic productivity low. The country is characterized by substantial mineral and agricultural potential, however these are constrained by rugged terrain, poor transportation and lack of irrigation throughout the country. Bolivia's largest export earner is natural gas, followed by coca and cocaine products, and minerals.

Table III-3 below depicts key development indicators for Bolivia.

Table III-3

## Socio-Economic Indicators For Bolivia

---

Population Size	7,300,000	1990 estimated
Urban	3,745,500	
Rural	3,554,500	
Proportion of Labor in Agriculture	46%	
Agric. % of GDP	24%	
Population Growth Rate	2.2%	
Electricity		
Homes with Radio	32.2%	
Homes with TV	2.7%	
Nat'l Gas Cooking	50.3%	
Electric Cooking	1.9%	
Food Self-Sufficiency	87%	
Education		
Male Adult Literacy	84%	
Female Adult Literacy	65%	
Fertility	5.0	children/mother
Infant Mortality	102/1000	
Literacy	81.1%	
Education	73.8%	of school age in school

---

Since 1985, the GOB's basic economic policies and programs have led to economic performance considered to be a model of stability and conformance with IMF structural adjustment requirements and sound economic management. The GOB has pursued a trade liberalization policy, and is promoting foreign investment. Inflation dropped from nearly 12,000 percent in 1985, to about 16 percent in 1988 and 15.2 percent in 1989. Unfortunately, the real rate of GDP growth has been low at only about 2.1 to 2.8 percent annually, roughly equal to the growth rate of population. External debt has been reduced by about \$400 million to a level of \$3.5 billion (about 4 times annual exports value) through a debt buy-back program. Debt service was about 51% of exports in 1988.

AID continues to urge a reduction in size for the public sector, as well as divestiture of public enterprises and passage of a privatization law. Improvements in the current financial system and passage of a new banking law are also reforms being promoted by AID. The economy, however, remains substantially supported by the illegal cocaine trade for foreign exchange and employment.

## 2. Migration and its Relationship to the Alternative Development Area

Migration in Bolivia is extremely important to support the production of illegal coca. Migration appears to be driven primarily by economic factors, and has not followed a consistent pattern, but rather has consisted of a series of mixed patterns over time. Migration has been directed primarily toward the large cities, and secondarily, to areas of land settlement or agroindustrial development. Unsustainable small-scale agricultural production appears to have been a major factor forcing out-migration. Particularly important has been the inability to have access to land, and land fragmentation following agricultural land reform. Soil fertility has also been declining and adverse market conditions contribute to out-migration. A major factor affecting the productivity of small-farmers appears to be lack of credit and technical assistance, and unfavorable prices for production. Loans given by state agricultural banks have been heavily concentrated among large-scale farmers, some 97% of funds between 1960-76 and 68% between 1978-83.

Migration to rural areas in Cochabamba, which is the major producing area for illegal coca, has tended to consist primarily of low-income social groups, while migration to the city of Cochabamba tended to be middle-class. Farmers from Mizque and Campero provinces in Cochabamba indicated that they migrate to the Chapare for rice, cassava, tropical fruit and coca leaves to chew. They also send home money, rice and coca.

Migration appears to be on the increase in Bolivia. There has been a tendency nationally over last two decades or so for the migration for agricultural employment to be greatest in Santa Cruz, Beni, Pando and Tarija. The inter-zone migration flow of the 1980's however, was centered on Chapare and Carrasco, in Cochabamba, where 97% of the national coca production is estimated to originate. Table III-4 below provides estimates of population and population change due to migration for the Chapare and Carrasco Provinces. The data from various sources vary considerably in magnitude, but generally shows a pattern of large-scale migration, with a substantial amount being of a transient nature.

---

Carlos A. Perez-Crespo, "Why Do People Migrate: Internal Migration and the Pattern of Capital Accumulation in Bolivia," January 1991.

Carlos A. Perez-Crespo, op. cit., pg. 22.



Table III-4

## Population Estimates for the Chapare and Carrasco Provinces

Year	POPULATION		Source
	Permanent	Transient	
1975	9,750	n.a.	INC
1976	30,000	n.a.	Census Data
1979	40,000	n.a.	PRODES
1983	142,000	n.a.	Blanes
1987	191,000 210,000	40,000	U.S. Embassy Montano
1988	208,000 350,000 175,000	n.a. n.a. n.a.	CIDRE Aguilo CEDIB

In order to stem the negative aspects of migration a substantial change in the availability of economic opportunity needs to take place, with greater attention to industrial development, less on extractive and service activities, and greater attention to increasing the productivity of small-scale agriculture.

Additional explanation for migration and the perceived needs of those in areas prone to migration into the Chapare are presented in a paper by James C. Jones. This paper is based on farmer interviews in the Aiquile and Mizque regions. Migration according to those interviewed was strongly associated with the lack of irrigation water or failed harvests due to drought conditions. Lack of water appears to be the most solid factor in the Aiquile and Mizque areas. Residents appear to indicate that even with substantial opportunity for coca growing, that they preferred to remain in their areas if adequate water was available for agriculture. The ultimate cause of the migration is lack of employment and income, and there was also found to be a strong impact from the volatility of agricultural commodities prices (e.g.

onions in 1988), with substantial additional migration in years with low cash crop prices. Survival appears to have been the primary motivation for migration to the Chapare, not accumulation of capital.

Furthermore, the general economic hardships of the 1980's in Bolivia had a lot to do with the plight of the rural population. For example, in 1986 some 27,600 workers of the state mining company lost their jobs. The GDP dropped by about 17% between 1980 and 1984. This was accompanied by a drop in the demand for food, and the worst drought of the century in 1983-84. The general finding is that the pull of drug profits was nowhere near as strong as the push from economic destitution.

Table III-5 shows the serious nature of changes in employment, particularly mining which caused direct and indirect dislocation by throwing almost 30,000 miners out of work, and lowering demand for many items previously consumed.

Table III-5 Employment by Economic Sector

SELECTED SECTORS	Percentage		Average Growth Rate	
	1980	1987	80-87	85-87
Agriculture	46.5	47.4	0.15	0.052
Mining	4.0	2.0	-9.57	-24.66
Manufacture	10.3	7.1	-5.63	-10.40
Construction	5.5	2.7	-9.58	-0.59
Transport & Communications	5.4	7.4	4.07	12.62
Other	28.3	33.4	2.40	n/a
Total	100	100	0.41	-0.46

Villegas and Aguirre 1989:59.

Shown below are various comparative data for several of the main areas considered as appropriate in the initial screening as part of the Alternative Development Project. Table III-6 demonstrates the overwhelming importance of Coca in the Chapare. The average size of coca plots is about 1.42 hectares, with some 35,942 producers involved.

Table III-6 Agricultural Production in the Chapare area  
(1988-Hectares, IBTA-Chapare & SUBDESAL)

Product	Hectares	Value (000)
Coca	58,956	\$75,763
Oranges	5,115	7,502
Mandarines	1,352	(all citrus)
Yuca	13,264	4,347
Banana	19,796	9,878
Avocado	115	
Papaya	185	104
Rice	19,958	1,753
Corn	3,286	399
Beans	112	
Tomatoes	42	
Watermelon	26	
Other	161	
<b>Total</b>	<b>122,342</b>	<b>\$99,749</b>

Studies performed for the Chapare cite the lack of secondary roads, small bridges, potable water facilities, sanitation facilities, schools, improved communication and electrification. Electrification was cited as essential to agro-industrialization. Credit was also noted, as was the problem with a transient population and the drug trade.

### 3. Other Areas

#### YUNGAS

The production of coca in the Department of La Paz is primarily concentrated in the North and South Yungas, with about 93% of the total in these two areas, grown in 8,300 hectares. The number of producers is some 23,299 with the average size of plot much lower than in the Chapare, only about 0.38 hectares versus 1.42 hectares in the Chapare. It is important to note that while the production of the Yungas is significantly lower than that of the Chapare, with the area planted being about 17%, the number of producers is 65% of those in the Chapare. The Yungas is largely a traditional coca production area, with only about 1,390 hectares or 17% being classed as zones in transition. Production in total in this area is about 6% of that in the Chapare.

#### SANTA CRUZ

The production of coca in the Department of Santa Cruz at this time appears to be small with only about 2,400 producers in the business, and about 845 hectares being cultivated. The population of Santa Cruz is about the same as the Cochabamba Department, about 1.165 million versus 1.056 million in Cochabamba (1988). Santa Cruz is characterized by large-scale agricultural production and high economic potential, as contrasted with the small-scale agriculture of Cochabamba and lower economic potential. Further consideration will be given to both Santa Cruz and the Yungas as the ADREP proceeds with analysis and screening, (consistent with Alternative Development program goals), as both constitute potential growth areas. This support may take the form of rural electrification technical assistance, credit and construction, all oriented toward job creation and economic impact.

#### D. Analysis of Existing Utility Condition

Electric service in the ADREP area is provided principally by the following utilities:

- 1) Alternative Development Area
  - a. Chapare (currently none but will be ELFEC)
  - b. Valles Altos - ELFEC
  - c. Yungas - CEY
- 2) Migration Areas - CESSA and SEPSA
- 3) High Potential Areas - CRE

There are of course, isolated systems operated by municipalities and small cooperatives which are not included in the above list.

Utility condition may be summarized as follows, from data collected in interviews with utility representatives and annual report analysis:

##### ELFEC

Number of Customers	100,000
System Peak	60,000 kW
Line length	1500 km
Financial Condition	Strong
Service Quality	Adequate
Outage Rate	20 hrs/yr

##### CEY

Number of Customers	4,100
System Peak	1500 kW
Line Length	200 km
Financial Condition	Weak
Service Quality	Poor
Outage Rate*	Long

\* Cooperative does not maintain records, but outages lasting days have been reported as "frequent".

##### CESSA/SEPSA

These utilities were not visited due to lack of time for field work.

##### CRE

Number of Customers	100,000
System Peak	100,000 kW
Line Length	1,600 Km
Financial Condition	Moderate
Service Quality	Adequate
Outage Rate	Not reported

## E. Regional Priorities

The overall analysis in this section is directed toward potential rural electrification regions, utilities and projects, and is intended to be illustrative and preliminary in nature. This screening will demonstrate the basic criteria to be used in the ADREP Project, perform the preliminary regional and utility analysis to identify project priorities, and describe and illustrate the methodology and criteria for project definition within the priority areas.

For policy reasons and due to the support nature of the ADREP to the CORDEP, the project in the first years will probably be concerned with Area 1, and to a lesser extent possibly Area 2. Within Area 1, the Alternative Development Program areas, there are three subareas, Cochabamba/Chapare, Valles Altos, and the Yungas. The UN financed Chapare electrification project will not be complete until FY93, so activity in the Chapare will be limited in the early project years.

The initial analysis will consist of a general screening for all three areas to both illustrate the screening approach and prospective relative benefits to rural electrification between Areas 1, 2 and 3. This will alert USAID and the GOB to any potential major economic development inconsistencies with priorities predetermined, as well as indicate opportunities in Areas 2 and 3 for later consideration in the national program. The second step described in detail in Section IV of this paper is a project-specific analysis to be performed for sub-areas in Area 1.

In order to perform the overall screening for areas 1, 2 and 3, a general criteria matrix is established in Table III-7 as shown below, which draws on the social, economic, geographic and energy supply and demand characteristics of each area.

Table III-7 Regional Screening Matrix

Category	ADA-Chapare	ADA-Valles Altos	ADA-Yungas/Asunta	Migration Areas - N. Potosi, etc.	High Potential Areas SC.
<b>I. Relationship to Alternative. Developmt Progm</b>					
Source of Coca	Yes	No	Yes	Minimal	No
Source or Destination of Migration	Yes-Destination	Yes-Source	Both	Yes	No
Processing, Transport or Other Relationship	Yes	Yes	Yes	Yes	Perhaps
<b>II. Existing Electrical Facilities</b>					
Status of Grid and Rural Electrification	None-planned only	Minimal	Moderate	Moderate	Minimal
Potential line extension	Planned/ADP	Moderate	Moderate	Moderate	Substantial
Potential Cost for Line Extension	High	High	High	Moderate	Moderate
Isolated Generation	Minimal	Minimal	Minimal	Moderate	Substantial
<b>IV. Area Socio-Economic Condition</b>					
Population and Income Distribution	Low-density & moderate-income	Low-density & low-income	Low-density & low-income	Moderate-density & low-income	Low-dens-moderate income
Economic Activity	High/coca based	Low-agriculture based	Low-agriculture based/mod. coca income	Low-agriculture based	High
Development Plans and Potential	Major plans	Moderate plans	Minor plans	Moderate Plans	Substantial Plans
<b>V. Capability of Existing Utility</b>					
Institutional and Financial	ELFEC capable-lack RE funds	ELFEC capable-lack RE funds	CEY managment poor need asst	Moderate	CRE Good
Promotion	Gen. developmt activity hi-None for electricity	Gen. developmt activity moderate-none for electricity	Gen. developmt activity moderate-none for electricity	None	None

VI. Existing Transportation Infrastructure	ADA-Chapare	ADA-Valles Altos	ADA-Yungas/Asunta	Migration Areas	Other Areas
Road System	Good	Moderate	Poor	Moderate	Good
VII. Existing economic Activity & Energy Use					
Energy Use Characteristics	Minor commercial use-major CORDEP plans	Minor commercial use/low electr use	Minor electricity & other use	Minor electricity & other	Minor electricity & other
Electricity Substitution Potential/Additional Uses	Minor/Moderate after CORDEP & UNFDAC grid extension	Minor-Moderate	Minor-moderate	Minor	Moderate for Santa Cruz
Potential Impact of Development Plans and Potential	Moderate-Major	Moderate	Minor	Minor	Major
Prospective Electrical Energy Consumption	Moderate	Minor to Moderate	Moderate	Minor	Moderate
Preliminary Conclusions	Good	Limited	Moderate	Limited	High

Preliminary conclusions of the area screening derived from the matrix and the results of meetings and document review are outlined below. A detailed analysis of the potential ADREP areas of interest will be the first project activity.

#### 1. Alternate Development Areas

##### CHAPARE

The development potential of the Chapare is good, given the level of resources being invested by CORDEP, PDAR, UNFDAC and others. Transportation infrastructure varies from moderate to good, if the main road from Cochabamba to Villa Tunari can be kept open. Climatic conditions favor agriculture and productive capacity appears good for subtropical crops, such as bananas and pineapple. The UNFDAC Chapare electrification project includes power source and main distribution system construction covering all important population centers in the coca growing region of the Chapare. This activity has no small scale productive uses component (some large agroindustrial uses are planned). The CORDEP project has plans for small agroindustrial activities, such as packing and refrigeration plants, but no electrification component. ELFEC, the utility to whom the electric facilities will be delivered is professionally run and has experience in rural systems. There thus exists an



opportunity for ADREP activity in productive uses promotion and financing of short line extensions. The UN project will not be complete until late FY 92 or early FY 93, so ADREP activities in the Chapare will not begin until FY 92.

#### VALLES ALTOS

The development potential of the Valles Altos near Cochabamba is constrained by a lack of water for agriculture. Landholding patterns are also not favorable for significant development (small plots of 1 Ha. or less). USAID/Bolivia has in the past promoted irrigation development through community wells or more traditional gravity/ditch systems, but funding for these projects is doubtful. There appears to exist considerable agricultural opportunity in the Mizque area if the water issue can be resolved. Transportation systems are adequate and a portion of the area has had electricity for a number of years. No productive use promotion was ever undertaken in the electrified area. ELFEC is the utility serving the grid-connected portion of the system and as noted is professionally run and capable. The isolated systems in the area are supplied by municipalities or small co-ops and generally do not provide electricity for more than a few hours a day, largely eliminating any potential for productive uses in these areas. ADREP activity opportunities include productive use promotion in the electrified areas (backfill), and development of line extensions to interconnect the isolated systems if determined by further study to be feasible. In the absence of irrigation improvements, however, it is likely that developmental success will be very limited.

#### YUNGAS/ASUNTA

Electrification of the Asunta Valley was studied by NRECA for AgroYungas (see Annex) and found to be economically but not financially feasible. The transportation infrastructure in this area is terrible, but a significant traffic in citrus, coffee and cut flowers manages to find its way to market in spite of the problems. Agricultural potential is moderate, and requires largely manual labor to realize due to terrain, but climate is favorable for fruit and coffee. Cultivation practices will have to be carefully designed in order not to exacerbate the existing erosion potential on these steep fields. Citrus, coffee, and other fruits and tree crops are under cultivation. Productive uses focusing on value added activities to reduce transportation bulk (juice extraction, coffee milling) should be attractive and feasible. A serious impediment to success of any productive use activity is the poor service provided by CEY to their existing Yungas loads. CEY would require a significant investment in technical assistance and hardware to regain the confidence of its consumers before it could be considered capable of expansion.

## 2. Surrounding Areas of Migration

Due to lack of time, no field examination was made of development potential of the Chuquisaca/Potosi area, however, reports indicate that conditions are similar to those in the Valles Altos. The UN is financing a significant irrigation development project in the area and it may be that opportunities for productive use promotion would follow. The utilities in the area are small provide only limited rural service and have no known system development plans. Their capability for expansion would have to be determined.

## 3. High Potential Areas

Development potential of the Santa Cruz department in general is high, and infrastructure is generally good for through traffic, though lacking for local farm-to-market traffic. CRE, the utility serving the city of Santa Cruz and some of the surrounding rural area, is very professionally run. The cooperatives serving isolated systems throughout the department are another matter entirely. Most were created by CORDECRUZ around diesel generators, have non-standard systems built of local materials, and do not provide 24-hour service. CRE has identified an area called the Valles Cruceños that they feel has significant development potential, due to the fact that irrigation is being successfully done with gasoline driven pumps. If there is sufficient agricultural promise that such a high cost irrigation method is profitable, then the project really should be evaluated closely.

The preliminary conclusion of this analysis is that, while much work remains to be done to better define regional potential, there are three main opportunities for initial ADREP activities:

- o Firstly, initial densification or backfill activities will enhance the economic significance of electricity use in existing areas of electrification in the Cochabamba department. Technical assistance in project evaluation, training in promotion, and credit for productive uses would be appropriate, along with utility technical assistance in energy conservation and load management. Interconnection of isolated systems or areas not currently electrified would await further developments in AID plans to promote irrigation.
- o Secondly, technical assistance in utility management and operations and some hardware investment would help CEY to improve their existing level of service. This would be followed by promotion of productive uses in the existing load area and analysis of opportunities for extension.
- o Thirdly, intensive project evaluation activities in the area of Santa Cruz adjacent to the Chapare would determine the development potential of the area and its ability meet ADP goals of encouraging alternatives to coca cultivation.

In addition, as the UNFDAC Chapare electrification project develops, ADREP would coordinate with the entities involved to establish a productive uses activity if justified by further analysis.

#### IV. PROJECT DESIGN AND IMPLEMENTATION

NRECA plans to implement the project from a base office in La Paz, although work may be concentrated in the Cochabamba Department during the first stages of developing the RE construction project portfolio. A core team of four professionals will be headed by a Project Leader skilled in productive use and energy analysis, as well as project management. An RE engineer will provide technical expertise to assist utilities and handle the construction aspects of the program. A Productive Uses Specialist will be responsible for productive uses program development, and a Financial/Operation Specialist will provide administrative support for utilities requiring that service, as well as being responsible for the steps to legally incorporate EFER. This team will be supported by a number of short-term consultancies to handle specific project needs, as well as by NRECA's LAC regional office in Costa Rica for administrative requirements.

The initial effort will focus on productive uses promotion and construction project identification. Of the four permanent project professionals, three will be dedicated to construction-related activity and one part time to EFER formation and part to financial and administrative technical assistance.

The four major components of ADREP will include the following:

- o Technical assistance and financing mechanisms for promotion of productive use programs in existing utilities aimed at increasing utilization of new or existing facilities;
- o Identification in accordance with rational, objective criteria, design, and construction of new rural electrification projects in coordination with other development agencies to serve approximately 15,000 new customers;
- o Technical assistance in system operations, administration, and maintenance to be provided to utilities in the Alternative Development target areas when required to improve their reliability of service to a level acceptable to potential productive use customers;
- o Establish and fund with AID seed capital a cooperative rural electrification finance company capable of providing sustained on-going support to member utilities in the areas above, and which can attract other private and public financing so as to coverage AID's seed investment by a ratio of 4:1.

## A. Productive Use Program

The productive use program will consist of a five step process. The initial activity will consist at a global screening of the three activity areas considered as candidates for Alternative Development program activities. Areas will be evaluated for each of the following criteria:

- a) Presence of intended beneficiaries;
- b) Existing productive uses and potential market benefits from electrification;
- c) Other productive use development plans;
- d) Existing infrastructure; and,
- e) Capabilities of existing utilities.

The areas will be ranked according to potential for high benefit/cost ratio for likely projects.

The second step of the process will require significant data collection in the area that has been selected as the highest priority for short term impacts for the project. With assistance from the Short-term Economist, the Productive Uses Specialist will direct a team of locally hired assistants to gather information on a number of important factors. Baseline data on existing use of electric and non-electric energy for typical productive uses will be collected and analyzed. A survey of productive uses equipment costs and characteristics will also be performed. Further, a study to determine the effect of electrification on the quality, quantity and cost of production will be performed in the target area. Last, the consumer and productive surplus due to electrification will be estimated.

The third step in the productive uses process will be performed concurrently with the second. This effort will be a direct extension of the results of step one. A micro level screening analysis will be performed to define and profile specific projects within the selected area. Backfill activities along the distribution main, productive use activities at the extremities of the distribution main, and opportunities to develop projects with isolated generation will be included in this analysis.

In step four, data will be collected to provide input to the Demand Assessment Model. Estimates of residential, commercial, small industrial, and agricultural loads will be recorded. These data will be collected for each project site within the project area.

The last step will be the application of the Demand Assessment Model, using the data collected in steps two, three, and four. The purpose of this activity will be to rank order the projects in terms of their relative economic benefits. A complete description of the DAM process is contained in Annex A.

The Productive Uses Specialist will be responsible for all steps in this part of the project. The Short-Term Economist will work under the direction of the Productive Uses Specialist, providing input at three stages. The Short-term Economist will assist in development of the screening methodology, review the results of the data collected, and the final project ranking.

Short term assistants will be hired locally to collect data in steps two, three, and four. It is estimated that up to six para-professionals will be needed for up to a six month period to complete the data collection.

The entire process to complete data collection, analysis, and project ranking should require an eight month period. Some modifications may be required to customize the DAM to local conditions, and thus the screening process may require slightly more time. However, the process will need to be completed by no later than the ninth month of the project to allow productive uses to be financed prior to years end.

At this point the promotion phase of the project will begin. In order to maximize the productivity of ADREP personnel, it would be desirable to work with the utility to provide a commitment of personnel for this activity. Ideally, the utility would agree to assign a person full-time to promotion activity so that the person could be trained and the effort sustained. A report discussing costs and potential benefits would be prepared for consideration by the utility management. ADREP will not provide any funding for utility personnel, encouraging the utility to sustain the activity following project completion.

Promotion activities would include meetings in the field with prospective new users, either individually or in groups connected with another agency's development project. Promotion activities will include energy use assessment, equipment, sizing, discussions of probable costs for both equipment and energy, and discussion of credit programs available.

The productive uses task will be repeated (steps two through five) for each of the four remaining project areas throughout the life of the project. The methodology employed will be essentially the same in each project area, but it may in fact vary according to needs and local conditions, and be improved as this process continues.

## B. Construction Activities

In general, construction activities will sequentially follow productive use analyses throughout the project. The productive use activities will allow the economic selection of projects, and a subset of those projects will be financed with funds from the construction program.

The construction activities will be comprised of four parts. During the initial productive use task, a set of equipment and construction standards will be drafted by the Rural Electrification Engineer. Assistance from the Short Term Rural Electrification Engineer will be provided to design the standards, and to review the conclusions and recommendations of the field office Rural Electrification Engineer.

After the standards have been drafted, and the productive use analyses have been completed, the procurement process for hardware will begin. Hardware for backfill activities will include primarily equipment for new connections from existing distribution lines, including transformers, service drops, and meters. However, as some analyses may yield high economic returns for new distribution spurs, and perhaps isolated generating equipment, equipment of this type may also be included. Efforts will be made to begin procurement for the first-year construction in parallel with the site analysis, in order to avoid unnecessary delays in construction and consumer connection.

Since one of the impediments to expansion of productive uses is the high cost of customer connection (meter, service drop, transformer if required), project funds will be granted to the utility to be used on a revolving basis to finance connection costs over a reasonable period. Terms and conditions of the revolving fund will be subject to review and approval by ADREP and USAID/Bolivia personnel.

In addition to the financing program for utility equipment, a percentage of ADREP funds may be used to finance end use equipment for the productive uses program. For example, if a diesel-driven maize mill is identified near to an existing distribution spur, funds will be needed to finance the electric motor and associated equipment for the conversion from diesel to electricity. Alternatively, in many cases, installations of new equipment will be required to increase productivity and profitability of target productive uses.

A financing facility dedicated specifically for this purpose will assist in moving the project along at an accelerated pace. In this regard, project staff will develop a joint agreement with an existing small- or micro-enterprise development organization to finance the productive use equipment. ADREP funds will be invested in this facility, under the conditions the loans are co-financed by the credit institution, and used specifically for income generating activities tied to ADREP project activities.

This activity will be managed by the Chief of Party, with assistance from the Rural Electrification Engineer and short term assistance provided as necessary by various NRECA expertise. The productive uses investments will begin in the ninth month of the project. The construction standards task will be initiated in the second month of the project.

During the project's second year, a more extensive line construction project consisting of approximately 300 km of primary and secondary distribution line will be identified within the Alternative Development area of interest. The process indicated above will be used to identify promising candidate areas, which will then be ranked and selected based upon potential economic return on development funds invested. It is anticipated that the project will be executed in conjunction with an existing utility as counterpart, although this will have to be determined during the evaluation process.

#### C. Technical Assistance in System Operations

In order to achieve an increase in productive uses, it will be necessary to provide system operation/administration and technical assistance to several utilities in the Alternative Development area. Depending on the utility involved the areas requiring assistance may include:

- o Voltage control.
- o Improved maintenance techniques to provide acceptable reliability of service.
- o Administrative loss control in the areas of meter reading, billing, collecting, etc.
- o Technical or system loss identification.

The objective of this effort to improve utility service provided to the point that potential productive users would consider acceptable. This technical assistance activity would be conducted by the Rural Electrification Engineer assisted by the Financial/Operations Specialist in parallel with the productive uses program.

Another parallel effort, carried out by short-term consults under supervision of the team RE Engineer, will be TA for the wood pole manufacturer in Cochabamba supplying poles to the construction phases of the project. As noted, quality of product from this plant has been very spotty and a TA investment (as well as some possible hardware investment) will be needed to qualify this producer. In the event the producer does not sustain the quality improvements desired, imported poles will be used for project.



Another Technical Assistance activity, which would also involve the Productive Uses team, consists in providing RE site selection and system design services to alternative development projects of other agencies. Most of the agencies involved in the Alternative Development program have little or no expertise in RE. When their projects involve RE inputs, the ADREP team would be available to perform the RE portion of the project as the executing authority for the project. The counterpart agency would fund the activity but otherwise would have little involvement.

#### D. EFER formation

One of the principal objectives of ADREP is to establish a financing and technical support entity to help ensure the sustainability of the Alternative Development investments in RE. The proposed structure for this entity tentatively called the Empresa Financiera de Electrificación Rural (EFER), is described in Annex B. It will be necessary to obtain the consensus of a number of entities responsible in one way or another for RE in Bolivia before the final structure can be defined and the process of legal formation begun. Regardless of its precise structure, some attributes of the entity are clear:

- o EFER will require seed capital to provide equity as security for international lending. This seed capital will be provided by ADREP project funds. Seed capital will not be loaned, but held as security.
- o EFER will be a combined finance and service organization, staffed as necessary to exercise supervision of borrowers.
- o EFER security will be based principally upon ensuring the cash flow of its borrowers.

It will be the responsibility of the Financial/Operations Specialist to undertake the following activities during the first year of the project.

- o Perform a survey of international lending institutions to define acceptable security arrangements which are likely to result in the lowest delivered cost of financing. Development institutions such as IDB and World Bank would be polled as well as other private and quasi-private entities.
- o The results of the survey would be presented to RE utilities in the form of a report recommending a structure and security arrangements in the interest of obtaining consensus from this group which represents the bulk of the electric utility industry in Bolivia.

- o In addition to working with utilities to define a structure acceptable to the industry, the Financial/Operations Specialist would be working with the Ministries of Energy, Planning, and Finance to arrive at consensus on the policy issues to be resolved and to take action on implementing any Memoranda of Understanding, etc. deemed to be required.

Once the structure of EFER has been determined and any policy issues resolved and reduced to MOUs, the legal formation of EFER as a corporate entity can begin. A Bolivian legal counsel would be retained and any necessary legislation will be drafted and hopefully enacted with the combined support of the Ministries and the RE utilities, through a representative body.

Bylaws and a business plan will be prepared with the assistance of the Bolivian legal counsel all the obtained approvals necessary to start a business in Bolivia. At this point a study will be conducted of Bolivian financial institutions with an eye to finding one that could be contracted to administer the institution. It will be necessary to find an agent that has experience in development lending, and international operations. Hopefully the agent would be willing to take a small equity share in EFER, in order to encourage it to operate the institution in an interested fashion. It would be desirable to have EFER operated under contract to avoid the time and expense necessary to establish a staff and develop procedures, etc., as well as to avoid the creation of yet another bureaucracy.

As noted, forming the simplest new business in Bolivia takes the better part of a year, and EFER will not be simple to form. The earliest that this formation process can happen is late in the second year of the ADREP project. AID seed capital would be made available to EFER at this time and the agent would begin soliciting international financial participation. The first loans would likely not be forthcoming until the end of the third year of the project due the delay in obtaining international loan funds. (The initial AID capitalization would not be loaned out, but would be held as security and to provide an income stream for project analysis.)

As EFER becomes operational, the productive uses and technical assistance activities defined earlier would be transferred to EFER with the goal that by the end of the fifth year of the project (end of ADREP), EFER should be conducting all of its chartered activities with its own funds.

#### E. Project Schedule

ADREP will follow an annual schedule consisting of several parallel activities. For example, in the initial year of project implementation, the analytical procedure required to identify attractive investments in productive uses activities and line construction will be performed in the first six months of the project year. Concurrently, a review of standards for equipment and procurement activities will be initiated.

The figure below illustrates the five year project schedule as it is currently envisioned. This schedule will no doubt be subject to change, resulting from adjustments made by ADREP staff and USAID/Bolivia directives.

**PROJECT ACTIVITY SCHEDULE**

ACTIVITY	FY 81	FY 82				FY 83				FY 84				FY 85				FY 86					
	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
PROJ. SELECTION																							
Nat'l. Analysis	XXXX																						
Baseline Study	X	XX		XXX					XXX					XXX						XXX			
Project Def.		XXXX			XXX				XXX					XXX						XXX			
Data Collection		XXXXXX			XXXX				XXXX					XXXX						XXXX			
DAM Analysis			XXXX		XXX				XXX					XXX						XXX			
Evaluation								XX														XX	
Promotion				XXXX	XXXX	XXXX	XX							XXXXXX						XXXXXX			
<b>CONSTRUCTION</b>																							
Procurement Uses				XX	XXXXXX				XXXXXXXXXXXX					X	XXXXXXXXXXXX				XXXXXXXXXXXX				
Standards Dev.			XXXXXX																				
Spec. Design				XX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	
Procurement					XXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	
Construction									XXXXXXXXXXXX					XXXXXXXXXX					XXXXXXXXXXXX			XXXXXXXXXXXX	
<b>TECHNICAL ASSIST.</b>																							
Def. of Needs	XX	XX							XXX														
Spec. of Plan			XXXXXX																				
Training			XXXX		XXX		XXX		XXX					XXX						XXX		XXX	
Follow-Up				XX	XXXX				XXX					XXX						XXX		XXX	
<b>E. P. &amp; R.</b>																							
Structural Def.		XXXXXXXX																					
Policy Devt.			XXXXXXXX																				
Legal Formation				XX	XXXXXXXXXXXX																		
Agency Selection							XXX																
Capitalization								M						M									
Evaluation								XX					XX									XXX	
Perf. Instruments								XXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX

## V. PROJECT IMPACT ANALYSIS

### A. Relationship with AID/GOB Goals

In analyzing the potential impact of ADREP it must be noted that electrification by itself would likely have little impact on shifting labor from coca production to alternative activities. It could simply make living conditions for coca growers better, at one extreme. Consider this illustration: If a child is fighting with his siblings a parent may elect to put a broom in his hands in order to occupy him with the more productive and benign task of sweeping the floor. Should the child decide to use the broom to inflict even greater pain on his siblings one can hardly blame the broom manufacturer. On the other hand should the child decide to not only clean his room but the whole house, it is doubtful that the broom manufacturer could rightfully take the all the credit for the clean house.

A critical assumption is made that providing people in the target areas with infrastructure is a necessary part of the attempt to displace the lucrative economy of the illicit drug trade with a new and vital alternative economy; indeed evidence in other countries of this linkage is apparent. But, as with the broom above, the infrastructure can be used either to produce cocaine more efficiently or, if linked with complementary development investments, to participate wholeheartedly in the new economy. Thus one must be careful not to limit measuring the success or failure of RE by the number of hectares of coca eradicated.

RE is an infrastructure component of an integrated alternative development program whose goal is coca eradication through improved economic conditions resulting from legal activities. This goal is supported by a series of objectives in such areas as:

- o Family income generation
- o New job creation
- o Migration control

Each objective is supported by strategies, one of which is construction of rural electrification improvements. Other strategies include road construction, market assistance, crop adaptation and agricultural extension. All strategies are interrelated and the failure of any one will affect all the others.

Electrification, in particular, has been shown to be an enabling rather than a promoting development impact. This means that while electrification can enable development activities to be successful, it will not directly promote development activities in the absence of other inputs, thus it is essential that ADREP activities be coordinated with complementary development activities, such as road construction, irrigation projects and others.

In order to have baseline data by which to measure progress it would have been extremely useful to have already had the results of the planned National Rural Household Survey to be run June-July 1991. Depending on the speed of preliminary data processing, the Project baseline system may still use most likely be necessary to invest project resources in site-specific surveys nevertheless.

Site evaluation, selection, design, and construction will be tailored to tie in with USAID/Bolivia Alternative Development goals. USAID plans to continue giving priority to the ongoing Chapare Regional Development Project and its follow-on activity the Cochabamba Regional Development Project. These projects comprise activities in the Chapare and High Valleys of Cochabamba, as well as in neighboring areas of influence, which include Upper Yacani in the Department of Santa Cruz. Part of the project emphasis will be on infrastructure such as rural roads and RE aimed at providing alternative jobs and income.

Well-designed and well-managed RE projects which include aggressive promotion of Productive Uses can serve to support "...the Mission's strategic objective of Alternative Development [which] continues to be the transformation of the Bolivian economy to increase investment, productivity, and employment in non-coca activities."

The following more specific Mission objectives are in one way or another related to RE:

- o carry out a water resources inventory in Associated High Valleys (May 1991)
- o identify areas with high economic potential to target for rural electrification (June/July 1991)
- o establish a PRODEM office in Cochabamba
- o prepare radio and TV spots and train a technician to continue that work
- o involve private sector in marketing alternative agricultural products from rural area of Cochabamba

The logical sequence of these objectives could be summarized in this way identifying the resources (both human and natural, including water) to rank and then select RE sites, whereupon financing and credit options can be made available in coordination with educating people in regards to electricity and promoting Productive Uses to get the private sector involved in producing and marketing alternative products.

Of the new projects that USAID/Bolivia is contemplating, the Natural Resource Management, Forestry Management, Rural Roads for Alternative Development, and Micro and Small Enterprise Development

(Amendment No. 1) have links with RE. Ecologically sensitive, environmentally sound projects must be promoted, both for generation of electricity (such as hydro sites) and for Productive Uses. Wood pole production for the power industry could be tied to reforestation projects, sensitive tree harvesting, a wood treatment industry, and careful quality control to accomplish mutual environmental and RE goals.

Adequate rural roads will facilitate construction, maintenance, and operation of rural electric systems while also making it easier to transport Productive Use products to distant markets. The major part of Bolivian industry falls in the micro and small enterprise category. From evidence acquired thus far, Productive Uses are likely to follow this pattern and would greatly benefit from having an aggressive development and promotion program. The three principal institutions contemplated under this project are PRODEM, FENACRE, FEBOPI and we would recommend making obvious and well understood links between these agencies and Productive Use promotion.

These agencies have varying levels of responsibility for Alternative Development but are not set up to deal with the issues specific to RE. As such they represent potential funding counterpart for ADREP activities. The ADREP Technical Assistance team will be available to assist these agencies with RE project feasibility assessment and design. Funding only would be provided by the counterpart, with execution the responsibility of NRECA. In this fashion, AID resources can be leveraged without risk of misapplication by inexperienced agencies not familiar with RE.

## B. Environmental Issues

### 1. Environmental Impacts of Distribution Project Construction and Productive Use of Electricity

The construction of electricity lines in rural areas involves a certain amount of negative impact on the environment, some permanent, but most temporary. In the design of any project funded line construction activities, the project team will use techniques and standards that will minimize the negative impacts on the environment. Construction by nature involves some disturbance of the local environment which could be a wildlife species habitat or the turf of some unique plant species. The initial clearing of the right-of-way, and the following routine maintenance are normally very quickly accomplished, and historically no major or lasting negative impacts result. Open construction trails can contribute to sediment load in streams and increased soil erosion. Distribution lines are normally constructed near roads or other areas disturbed by human activity, so any impacts are generally incremental rather than primary. In areas where slopes are steep enough for runoff-caused erosion to be a problem, distribution

structures are generally set manually, since equipment cannot negotiate the terrain and no roads are constructed.

Distribution lines are constructed using treated road poles to increase system longevity. Preservatives likely to be used on this project (i.e. creosote, various arsenical salts) are approved by EPA for this use and do not represent a hazard to human or animals when properly handled. Project team personnel will instruct crews in proper handling of preserved wood materials.

In village situations, care must be taken to install poles, wires, transformers, and even meters, if used, in such a way as to eliminate any electric shock or fire hazard. While this might seem common sense, without training and public education activities, a hazardous environment can be easily developed.

Productive use of electricity can provide substantial environmental benefits and the project team will initiate an extensive productive uses program. Besides the environmental benefits that can accrue, productive use is necessary to develop the economic activity essential to assure a sound, and financially sustainable project. Project team activities will only be implemented on this basis and the project team will monitor all projects to confirm performance and quantify benefits. The following positive environmental benefits should accrue as a result of a successful productive use promotion:

- o Electricity displaces petroleum fuels and eliminates harmful smoke and fumes that result from burning kerosene, gasoline, or candles;
- o Clean, safe water supplies can be pumped from safe sources avoiding contact with many harmful organisms;
- o Foodstuffs and medicines can be refrigerated with many potential health benefits;
- o Productive use of the generated electricity can lead to employment opportunities with the resulting wages allowing better living conditions and access to better health care; and
- o Central station generated power delivered by transmission and distribution systems produces fewer overall pollutants than multiple isolated generators.

This is a sample of the benefits and impacts to be expected.



## 2. Environmental Impact Due to Generation

Adding electricity generation plants to rural areas can have both positive and negative impacts. The obvious goal of the ADREP construction activities that will involve generation will be to maximize the positive impacts while trying to minimize the negative ones. That suggests that certain project standards will have to be developed by ADREP for construction, and operations monitored to guarantee adherence.

Most often, isolated power plants are installed with proper management and operating guidelines to insure minimal impact on the environment, but proper training may not be provided, and operations ignored until problems develop. Some examples of possible negative environmental impact with an isolated diesel power plants include:

- o Diesel and lubricating oil spills into soils and nearby water sources
- o Extreme levels of noise around the plant site
- o Dangers to children from poorly stored or discarded mechanical equipment
- o Increased traffic on bad roads for fuel supply

The choice of energy source will be carefully evaluated to optimize the selection against economic, technical and environmental criteria. Renewable technologies will be employed wherever possible. Training programs will be designed and implemented into projects on a regular basis, and always for new employees. Appropriate construction standards will be mandated and their use verified. Operations and maintenance procedures will be initially approved and intermittently checked to insure efficient and safe operations.

With a successfully designed and implemented project, the generation of electricity should result in positive environmental benefits. When properly sited, designed installed, and operated, local generation can:

- o Displace distant generation that uses expensive or more environmentally threatening fuels
- o Displace construction of transmission facilities and their environmental impacts
- o Reduce losses on interconnecting transmission and/or distribution systems.

- o Provide system redundancy to defer construction of backup transmission/distribution systems.

Again, the list is not exhaustive and more environmental benefits can accrue. ADREP will monitor implemented projects on a regular basis to verify that a sustainable condition has been achieved and to quantify the environmental benefits.

Care must be taken in productive use promotion to insure resulting activities do not overtax the local resources to the point of causing adverse environmental impacts such as deforestation and land erosion, depletion of groundwater supplies, and other problems. A sound project design and supporting infrastructure will be tools of the project team to assure a net positive impact for all generation implementation actions.

### 3. Site-specific Environmental Assessment Procedure

The foregoing discussions have of necessity been general in nature, since project site and detail designs have not been prepared. In order to properly assess site specific impacts, individual reports will be prepared when project parameters are better understood. The project time will follow the guidelines contained in 17CFR1741 in determining the level of assessment required for any given project. 17CFR1741 was prepared by the U.S. Rural Electrification Administration (REA) specifically for environmental assessment of rural electrification facilities including generating plants. As such, it has been uniquely designed to properly assess the likely impacts of such facilities. All project environmental documents will be submitted to USAID/Bolivia for review and approval prior to commencement of construction.

#### C. Impact on Women

Bolivia by international standards is a poor country and has a high percentage of very poor rural residents. In the rural areas, the activities of women are often under valued and unrewarded, as are wages in the labor market. The result for poor rural women is a very harsh environment. It has been estimated that rural women spends up to 120 hours per week on animal care, agriculture, child care, food preparation, and collecting firewood and water<sup>1</sup>.

Providing electricity to rural areas most often provides domestic lighting improvements displacing candles and kerosene lanterns as sources of light. Electric lighting is higher quality and is free of smoke or fumes derived from inefficient kerosene lanterns.

---

<sup>1</sup>"Estrategia de Energia Domestica y Rural de Bolivia"  
Ministerio de Energia e Hidrocarburos, World Bank, April 1990.

Electric cooking, where available, allows further time saving and a smoke free environment if compared to woodstoves as kerosene cookers. On the other hand, the available and affordable electric light can result on extended work hours for the women, thus increasing the work burden.

Productive electricity use including water supply, availability of electric motors for sewing, milling and refrigeration provides tremendous domestic benefits. These benefits directly affect the quality of life and degree of difficulty experienced by women working in the home and on the farm.

Productive uses of electricity in the rural areas can provide wage earning jobs either for women or for family members such that the family income increases. With the increased family income can come progressive improvements in the basic quality of life that disposable income will allow. In addition, energy and its productive use can lead to additional benefits such as improved nutrition through access to a wider variety of foods and food preservation processes.

Throughout the project, ADREP, project staff will periodically monitor socio-economic indicators to quantify the benefits and to determine the needs by which these benefits can be extended.

## VI. PROJECT EVALUATION AND REPORTING

### A. Monitoring Plan

ADREP monitoring activities will be composed of two major subparts. These include routine project monitoring consisting of progress reports at semi-annual intervals prepared by NRECA; and, formal evaluations conducted at the mid- and end-points of the project.

Project activities will be identified and described in annual workplans submitted to USAID/Bolivia for review and approval one month prior to the completion of each fiscal year. The workplans will include identification of key milestones from which project progress will be measured. Workplans will be concise and will include detailed budget information covering both funding and staff time.

Project monitoring will be performed in a collaborative manner jointly by NRECA and USAID/Bolivia. USAID/Bolivia will be responsible for project oversight, with NRECA primarily responsible for the project implementation, data collection on project progress, and reporting indicators of progress to USAID.

In addition to providing regularly scheduled reports on project progress, NRECA will collect additional demographic information that will assist USAID to determine the contribution of ADREP to the Alternative Development program. This will include data on levels of income and economic activity prior to and after electrification productive uses and construction projects have been implemented.

ADREP is a component of an integrated Alternative Development effort composed of complementary components addressing market access, water development, crop adaptation, and agricultural extension activities. Monitoring activities and evaluations will focus upon the indicators of ADREP progress, but will also measure the project's contribution to the overall objectives of the Alternative Development Program. The degree to which ADREP is able to contribute to these development objectives will be dependent upon the contributions of the other components of the Alternative Development Program (i.e., those funded and implemented by the Cochabamba Regional Development Project, and perhaps other related projects). Therefore, while indicators of enhanced economic activity can and will be measured to gauge ADREP success, these must be viewed in the context of the progress of the other components of the Alternative Development process. ADREP cannot, by itself, guarantee improvements in development indicators. Similarly, its success cannot be measured directly by changes in

such indicators. The focus on coordination between electrification and other development activities embodied in the ADREP project design must be evident in execution of complementary activities to enhance the likelihood of overall development success.

The formal evaluation process of the ADREP will consist of the following:

- a. The Project will undertake its first formal evaluation at the mid-point of the Project. The review will determine whether the Project is meeting or will meet established Project objectives, and if not, recommend changes necessary to achieve the Project purpose and objectives. NRECA and USAID/Bolivia will collaborate in the development of the terms of reference for this evaluation and the selection of the consultants, who will be paid with Project funds.
- b. A final evaluation of ADREP activities will be conducted by a team of consultants upon termination of the Project. This evaluation will be contracted with Project funds and carried out in accordance with a scope of work to be mutually agreed upon by USAID/Bolivia and the NRECA.
- c. NRECA and USAID/Bolivia, in coordination with the GOB, shall conduct joint reviews of the project prior to execution of possible amendments for the purpose of obligating additional funds.

Baseline information on specific projects and project activities will be developed and organized to facilitate these evaluations. Annual and semi-annual progress reports will be provided which review progress against annual workplans, problems being encountered and proposed remedies, and may propose modifications as appropriate.

Evaluations will be based upon the Logical Framework attached (See Annex D), the annual project workplans, semi-annual and annual progress reports, and the original agreement as embodied in the Cooperative Agreement with NRECA, as modified. Baseline information for determining the resulting accomplishments of the project on target beneficiaries will be derived from both the basic project surveys of household energy use, productive uses, the mission sponsored Rural Household Survey, and utility power consumption by customer class and specific areas as appropriate, and sub-project construction cost estimates. The following general elements will be contained in the evaluation program.

1. Additional survey of households and productive users, and participating utilities, to determine the benefits and costs of the project will be scheduled to coincide with the interim and final evaluation.

2. Construction activities will be evaluated in terms of reasonableness of costs, efficiency of funds administration and construction management, appropriateness of design and replicability and prospective longevity of facilities and equipment.

3. The establishment of a financing facility will be proceeding in stages. Therefore evaluation will address the extent to which project goals are being achieved for the appropriate stage of implementation, the soundness of the institutional arrangements and policies, private sector participation, utility and government satisfaction with the process and arrangements, soundness of administration of any credit extended, and effectiveness of application of funds.

4. Productive use credit activities will be evaluated in terms of the administration and management of funds, the appropriateness of beneficiaries, and the resulting benefits achieved from application of funds.

NRECA will be responsible for contracting for evaluations of the project, however USAID will approve the terms of reference and composition of the evaluation teams. Every effort will be made to ensure that the evaluations are objective, complete, timely and involve local participation to the maximum extent possible. Local participation may take the form of membership on the evaluation team; participation in evaluation team interviews, requested input information and written reports on satisfaction with results, and participation in review meetings and presentation of findings. USAID will have the opportunity to review and comment on the evaluation and evaluations will be revised as appropriate to take into account USAID comments. Copies of all data associated with the evaluation and evaluation reports will be provided to the USAID/Bolivia.

#### B. Financial Reporting

NRECA will provide an annual report of expenditures as required under the Cooperative Agreement. Accounting of funds should serve two purposes, first, to ensure that funds are expended in a financially sound manner for approved purposes, and second, to permit evaluation of the allocation of expenditures by programmatic category to allow tracking of functional expenditures and facilitate in evaluation. Financial reporting will follow standard provisions in the appropriate A.I.D. Handbook.

## VII. FINANCIAL PLAN

### A. Project Budget

The Life of Project budget is illustrated in Table VII-1 below. Costs have been allocated to four major activities, including the Construction Activities, Technical Assistance in system operation and administration, Production Use Promotion, and formation of a rural electric financing/service institution to provide sustained support to rural electrification institutions. These costs cover both NRECA technical assistance efforts, as well as costs for equipment and services.

Table VII-1. ADREP Life of Project Budget.			
Line Item	Obligated Amount FY91	Estimated Future Amount FY92-95	Estimated LOP Amount FY91-95
1. Salaries	\$238,000	\$1,040,000	\$1,278,000
2. Fringe Benefits	\$90,000	\$393,000	\$483,000
3. Overhead	\$160,000	\$700,000	\$860,000
4. Travel and Transportation	\$94,000	\$380,000	\$474,000
5. Allowances	\$55,000	\$337,000	\$392,000
6. Other Direct Costs	\$72,000	\$975,000	\$1,047,000
7. Office Equipment and Supplies	\$37,000	\$175,000	\$212,000
8. Commodities	\$194,000	\$10,060,000	\$10,254,000
9. Total USD	\$940,000	\$14,060,000	\$15,000,000
10. Local Currency	\$310,000	\$4,690,000	\$5,000,000
Total Project	\$1,250,000	\$18,750,000	\$20,000,000

The FY 1991 budget has been designed for a \$940,000 level of effort, with a request for a local currency contribution of \$310,000. Future year budgets will be determined by an annual review process, during which progress will be presented by ADREP

staff to the USAID Mission with proposed activities and respective levels of funding required to accomplish annual objectives.

#### B. Non-AID Funding

In addition to USAID funding, the project will actively seek funding from local and external sources to compliment ADREP funds. In the project design process, discussions were held with both bilateral and multilateral agencies to ascertain interest in collaboration and project co-financing. These discussions were uniformly positive.

During the early stages of project implementation, ADREP staff will continue to develop relationships with other donor agencies, NGOs, and regional development corporations to determine the means by which these funds can be used. Institutions that will be included in these discussions will include:

European Economic Community  
Inter-American Development Bank  
United Nations  
World Bank

Bilateral programs sponsored by Belgium, Canada, Germany, Great Britain, Holland, Italy, Japan, Spain, Sweden, and Switzerland will also be consulted. Non-governmental organizations such as Food for the Hungry, Mission Alianza de Noruega en Bolivia, Plan Altiplano, Proyecto Gilead, and others will be contacted.

These programs will in all probability wish to invest in specific projects. However, in some cases, such as the multilateral development banks, support will be sought to finance larger projects and electrification programs through Empresa Financiera de Electrificacion Rural (EFER). As articulated earlier, it is the intention of the ADREP project to leverage the USAID seed funding through the use of funds from other donor sources. The principal sources of this funding will be the multilateral development banks (IDB, the World Bank, and their commercial affiliates, IFC and ICC). Funding from EEC, Japan, Germany, Holland, and others will also be solicited, however.

One potential method for improving the equity position of EFER while at the same time providing an opportunity for development of future RE -- supply is for GOB to assign to EFER one or more of the COMIBOL hydro plants near La Paz which are now out of service due to mine closures. Such an assignment could be credited to GOB's local currency obligation to EFER, thus fulfilling an obligation to EFER without using cash resources.



### C. Linkages with Micro-Enterprise Development Programs

Due to the emphasis on promotion of productive uses of electricity, ADREP will seek direct interactions with micro-enterprise development programs financed by AID and other agencies. Providing electricity for productive uses is a necessary but not sufficient condition to promote income generation. In addition to energy, entrepreneurs will require access to financing and markets, both products that will require coordination with other programs.

Several programs are actively involved in micro-enterprise development in Bolivia. Discussions have already been held with FEBOPI and PRODEM regarding collaboration and coordination. The ADREP may initially buy into these programs, providing loan funds to qualified end-users through established mechanisms in specified project areas. Later in ADREP implementation, however, funds and technical assistance from these and other programs would be sought to complement energy services provided by ADREP to stimulate commercial and small industrial activity.

## VIII. HOST COUNTRY COORDINATION

### A. Overview

NRECA proposes to enter into a formal agreement with the Ministry of Planning that will establish basic guidelines for Project coordination with host-country institutions. This agreement will state that the Ministry will notify NRECA of other GOB/host-country entities with whom NRECA will interact for different elements of Project implementation. An illustrative agreement for this purpose is provided in Annex C.

Bolivia's institutional framework for implementing and regulating rural electrification represents a critical constraint in the GOB's infrastructural strategy for developing alternative economic activities in the target areas. This applies not only to the technical and operational capacities of the distribution utilities themselves, as discussed earlier, but most importantly, in terms of the national entities having the responsibility for allocating funding for projects under the GOB's Alternative Development Program as well as the RE subsector entities having responsibility for utility finance, regulation, and planning coordination. Hence the institutional arrangements for implementing the project constitutes a major issue in NRECA's plans for the project, both for the accelerated construction element, and of course, for the longer-range sustainability component.

Evidence of the institutional fragmentation on various levels is found in the recent failure of COFER, the GOB's former RE entity. COFER, like its predecessor INER, lacked funding, technical expertise in planning and designing cost-efficient high-return RE projects, and any visible knowledge of what is needed to offer useful management/technical support to rural electric entities. The GOB has announced plans to create a new national entity, DIFER, whose responsibilities are presently being defined. It will be important to have a role in determining this entity's function and participation, which should be limited to maintaining policies and standards for the RE industry without any mandate for financing or managing RE investment.

In the area of institutional coordination, there is a clear lack of knowledge in techniques for improving planning coordination between rural energy supply and use which the Planning Ministry, for one, openly acknowledges. Data collection and analysis has been very weak; little is known about energy needs in the rural areas and the quality of data that is available is suspect. The planning function of the Energy Ministry has been vested in a temporary Energy Plan consultancy which is about to be terminated. The rural sector aspects of this effort have not been published and appear to be incomplete. In any event, there will be an on-going need to understand the supply-demand linkages and to take appropriate

inter-sector planning measures so that RE investments will be coordinated to take full advantage of their economic potential.

#### B. Coordination with the GOB Alternative Development Entities

The following is a partial listing of GOB entities associated with Alternative Development.

##### Coordinating Agencies

- CONALID (National Council Against Drug Abuse and Illicit Drug Traffic)
- CONACE
- COPECE (Permanent Council for Executive Coordination)

##### Channels for Participation of Coca Producers

- CONADAL (Alternative Development Commission)
- COREDAL (Alternative Development Regional Committees)
- COLODAL (Alternative Development Local Committees)

##### Funds

- FONADAL (National Fund for Alternative Development)
- FCS (Social Compensation Fund)
- FIS (Social Investment Fund)

##### Ministries & Associated Offices

- MACA (Ministry of Rural Affairs and Agriculture)
- SUBDESAL (Undersecretariat for Alternative Development and Coca Crop Substitution)
- Social Defense (Undersecretariat of Social Defense)
- Prevention (Undersecretariat for Prevention, Treatment, Rehabilitation and Social Reintegration)
- Ministry of Planning and Coordination
- SNIP (National Public Investment System)
- SISIN (Information System on Investments)

##### Other

- DIRECO (Dirección Nacional de Reconversión Agrícola)
- PDAR (Programa de Desarrollo Alternativo Regional).

The guidelines for drug control and Alternative Development are set forth in Law 1008 (the Law for the Regulation of Coca and Controlled Substances) and the PIDYS (The Integrated Plan for Development and Coca Crop Substitution) which were both approved in 1988. The Law defines three coca production zones: traditional production, surplus [excedentaria] production in transition, and

illicit production. Given the integrated character of the Plan action is to be taken in the following areas: agricultural production, its possibilities for industrial transformation, marketing, basic infrastructure, credit, generation of electricity, education, health, environment, and institutional aspects.

The fundamental objective of the Plan is to displace coca-cocaine production from its pivotal position in the generation of surplus by means of developing other activities, especially in agriculture, forestry, and ag-industry, providing the affected areas with productive and social support. The Plan calls for the following regional investment priorities:

- First Priority: Surplus Zone in Transition (Chapare)
- Second Priority: Traditional Production Zone (Yungas)
- Third Priority: Population Expulsion Zones Linked to Coca Production (High Valleys and Northern Potosi).

Potential counterparts with whom contact has been made include SUBDESAL (the Subsecretariat for Alternative Development) who is promoting alternative development in the Cochabamba department through PDAR (Regional Alternative Development Program), including studies of electrification in the Associated High Valleys (the Aiquile-Mizque Project). UNFDAC (the UN Fund for Drug Abuse Control) has also expressed interest in joint activity in the Chapare. Although the current UNFDAC Chapare Project will shortly electrify almost all of the most economically interesting part of the Chapare, the agency has no productive use promotion activity planned and has expressed interest in participating in such a program with NRECA. CONALID (the National Council on Drug Abuse and Illicit Drug Traffic) has also expressed interest in cofunding projects identified by NRECA's team as well as obtaining assistance in project assessment. Changes have been proposed in the structure of CONALID, however, and it may no longer be an executive agency. Such a change would limit its ability to fund projects.

Private sector counterparts for the productive uses program have been contacted also. FEBOPI (Bolivian Federation of Small Industry), a USAID private sector activity, has expressed interest in coordinating a credit program to provide financing for purchase of productive use equipment from FEBOPI resources and financing for utility equipment from the ADREP program. Coordination with the PRODEM program is also a possibility, although this agency does not concentrate on rural activity.

### C. EFER Coordination Considerations

An entirely different menu of agencies will be involved in creation of EFER. Clearly, the MEH, through DINE, will have to approve the tariff preemption provisions proposed for security on EFER loans, as well as the first mortgage position for EFER debt. As EFER is intended to act as a bank, even though it will not accept public deposits, the Superintendent of Banks may be involved in start up as well as review of continuing operations. INALCO will have some regulating authority also, if EFER is constituted as a cooperative, as is presently envisioned. Outside the GOB, the most influential entity in the utility industry is ANALEC, (National Association of Electric Utilities). ANALEC represents the largest utilities in Bolivia and is largely funded by ENDE (the National Electric Utility) who exerts considerable control over its activities. ANALEC's Board of Directors has expressed support for the concept of EFER. A copy of a letter recording the decision of the Board is attached as Annex E. Further support will be necessary to encourage Ministry cooperation.

As noted, ANALEC represents few of the electric cooperatives which are the principal suppliers of electricity in the rural areas. This means that, while ANALEC's backing is necessary, it may not be sufficient to ensure that the benefits of EFER reach the intended rural beneficiaries. Further coordination directly with the cooperatives will definitely be required.

## IX. Statutory Issues

As the ADREP project is to be funded through the U.S. AID office in Bolivia, it is subject to certain statutory criteria applicable to development assistance and economic support funds sources. Annex F contains the answers to the questions generally applicable to such projects on three such statutory criteria forms labeled Annex F.1, F.2, and F.3. The project has been found to be in compliance, including all of its various elements.

## ANNEX A

### DEMAND ASSESSMENT MODEL METHODOLOGY

#### A. Plan for Site Analysis Methodology, Including Criteria for Project Evaluation

The rural electrification site selection process is critical to project success. This process involves screening potential sites for comparative economic potential by using a model to quantify the financial and economic performance of each respective electrification project. The goal of this process is to develop a project portfolio ranking projects by comparative economic value. The assessment of alternative rural electrification projects within the RE Project is performed through the use of the NRECA/Demand Assessment Model (DAM), supplemented with accompanying special purpose analyses (e.g. of tariffs, productive financial analyses). The objective intercomparison of various rural electrification alternatives is essential to effective utilization of scarce funds. The DAM approach brings together a wide variety of factors, reduces these to monetary terms, and evaluates these consistently in a quantitative framework. Comparisons in the DAM model are made on both financial and economic terms. Final judgement on projects requires additional qualitative and policy judgement.

One of the principal characteristics of the procedure to be followed for site analysis is its ability to contrast the technical impacts and economic benefits of productive uses of electricity for each project. A productive use of electricity is defined as the use of energy to produce a marketable product or service. For example, domestic lighting provides an enhancement in the living conditions, however, in most cases, this use of electricity produces no measurable financial (productive) benefits. It is therefore not considered a productive use. The use of electricity in a store, however, may enable the owner to extend business hours, increase sales, and perhaps increase net income. The use of electricity in a manufacturing process may likewise result in increased production and enhanced product quality. The model to be used allows the user to quantify economic benefits through a calculation of productive uses and their impact on project viability.

Rural electrification project analysis will help to address a variety of important issues including: the amount of subsidy or grant element required to make the project affordable to the intended beneficiaries and to reflect the economic value of the project; forecasts of future loads, industry conversion capability from other existing energy uses to electricity; and estimation of

the financial and economic benefits of electricity itself. The model to be applied has five major components. These are described below to clarify how the methodology is constructed, discuss key methodological issues, and describe planned improvements.

1. Project configuration and cost. Cost for the project must be estimated in terms of physical infrastructure and equipment, operating and maintenance and replacement. These costs will depend primarily on the location of consumers versus the source of supply, the difficulty of terrain for transmission and distribution construction, the construction standards applied, and generation cost (marginal cost per Kwh purchased).

2. Projected electricity consumption and losses. Consumption must be estimated for the given project, and will depend on current and future population size, income levels, economic activities being undertaken and potential for conversion of current alternative energy uses to electricity.

3. Tariffs or electricity prices. Tariff levels are likely to reflect project cost, past project expenditures and debt service, marginal cost of new generation, and rate of return allowed. Tariffs for electricity may be set on one or a combination of the following bases: a) to earn the utility a given rate of return, b) to maintain a "national" average level, c) to maintain current levels plus inflation, or d) be based on a combination of the preceding plus some estimate of the ability to pay. Tariffs levels are critical to financial success and are considered an important policy variable, however they are more often than not an external input to the site selection (DAM) analysis. Given a fixed tariff, the model calculates the financial and economic return based on revenues (tariff times quantity consumed), less cost discounted over the life of the project.

4. Local or cooperative contributions. Determination of a level of contribution for the community, cooperative or local utility to the costs of the project. Equity investment, in monetary terms or in-kind (e.g. labor or materials), will reduce requirements to be financed and improve the financial and economic cost-benefit for the particular project, or community connection (subproject element) within the project.

5. Subsidy or grant element. Rural electrification projects normally contain a grant or subsidy element since the returns to the project given a predetermined level of tariffs is often inadequate to compensate for the running and capital costs of the project. The subsidy in economic terms is an attempt to include either social or non-quantifiable benefits. The rationale for this subsidy may be for social reasons, to



stimulate economic development, for geographic redistribution of income, or "Alternative Development" or coca growing employment substitution purposes, etc. In practice the level of available subsidy in Bolivia has been a function of national level allocations of tax revenues based on the income generated in different departments in Bolivia, local tax revenues from local economic activity, and whatever additional donor or government funds may be provided for other reasons.

Model output is designed to aid in ranking of projects. Output is presented as benefit/cost ratio, internal ratio of return, or net present value for a specific project.

In most cases, the most economic means of providing electricity to end users targeted by the project, will be through a grid interconnection. In some cases, however, use of isolated power sources, including diesel, hydroelectric, or other non-conventional power technologies may be feasible. Under these special circumstances, analyses will be performed to estimate the costs and benefits of these power sources in contrast to line extension.

Bolivia has as a part of its energy resource base a substantial hydroelectric power potential from its many mountain rivers. Historically, mini and micro-hydroelectric units have been installed to service isolated rural areas. The advent of petroleum fuel availability suppressed such small hydro development in recent decades, however volatility in prices for petroleum fuels, difficult transportation links resulting in less than reliable supply, and other factors have reawakened the demand for consideration of the use of small hydroelectric systems.

Whenever isolated mini-distribution grid projects are identified, the NRECA team will conduct an energy resource verification to guarantee that environmentally benign, renewable energy resources have been included in the options analysis. As Bolivia is subject to wet and dry seasons, it is important that a thorough hydrological study be verified to feed into the design process, whenever hydro is a consideration. The rural topography in the isolated areas tends to permit high head hydroelectric applications that can be very cost effective with a reasonable water supply.

Based on an evaluation of the initial and projected load demands compared to the energy production capability of the hydro system as per the hydrology, a final system might require an initial, or later, combination of the hydropower with a conventional source such as natural gas, spark ignition engine-generators or diesel engine-generators to allow the real demand to be met, seasonally or otherwise, especially for productive use economic activity stimulation.

For all such hydro applications, the NRECA team will use evaluation models normally used to evaluate the potential performance and

costs of small hydro projects to verify any existing information. The hydro case will be subjected to the complete feasibility analysis process, and will only be specified if it is clearly the best option. In defining the best option, the criteria will be the least cost energy supply over the life of the project, and not simply front end capital cost.

Standard specifications will be prepared for the type of hydro equipment suitable to the conditions in Bolivia. A preapproved bidders lists will also be made so that a competitive bid process can be conducted for all equipment. The project team will evaluate every opportunity to determine whether or not a turnkey approach with a single source of responsibility is the best approach for the implementation.

As hydro projects require more front-end analysis besides the hydrological study than do conventional projects such as diesel engine projects, it will be necessary for the project team to devote such resources as a compensating factor for the ultimate savings of petroleum fuels. Such extra effort would be required for example to do significant geologic studies at the dam, canal run, and penstock run sites. Storage type projects other than daily peak coverage options will only be considered if environmental conditions will allow minimum impact in and downstream of the storage area.

When multiple potential sites are available, the NRECA will conduct comparative analysis, or will verify any such analysis already completed. The project team will produce a standard hydro site evaluation process so that cooperatives and later ( EFER ) will use a standard approach for initial in-the-field evaluations that will flow into the DAM model evaluations. When a project is identified as feasible, preparation of final design and procurement specifications will begin when a tentative source of funds is identified, inside or outside of the ADREP project.

Bolivia has substantial natural gas resources that can and will be used to spur national economic development. As the extent of the natural gas pipelines increases, more rural sites can be electrified on a financially sound basis with small slipstreams taken off major gas pipelines. In small sizes normally used in the rural areas ( less than 1000kw individual unit size ), medium speed spark ignition engines can provide cost-effective and reliable service. ADREP will consider such applications for isolated mini-distribution grid systems. The project will define the maximum distance from a pipeline that makes financial sense for the size and revenue producing capabilities of such rural projects. The project will also work with the appropriate GOB entities to define an optimum gas price for rural electrification, if the current price does not provide sufficient financial or economic return.

In some instances in Alternative Development programs the use of

high value diesel fuel can be justified for various social reasons. Medium speed diesel engines also can provide reliable service in the isolated rural areas in the 1000kw or less size.

The project will only consider diesel engine applications as a last resort when positively no other options exist. As the transportation network in Bolivia is not highly developed, the real cost of delivering diesel fuel to the rural areas is very high and the economic penalty can be severe.

Whether spark ignition or compression (diesel) engines are used in the isolated systems, the proposed projects will be subjected to complete feasibility verification. Standard specifications will be developed by the project team that will require that both types of engines be of the medium speed type operating between 500 and 1000rpm. Such a specification will guarantee that down time between overhauls is minimized, reliability is optimized, and foreign exchange tied up in spare parts is optimized.

Once feasibility is verified and a tentative project or outside funding source is identified, final design and procurement specifications preparation can begin. The project team will assemble a preapproved bidder's list so that a competitive purchase can be made when approval to implement is given.

Having gone through the above described screening process to choose the most appropriate option, whether grid extension or isolated - minigrid generation, the actual design, specification, and construction process will be according to the appropriate U.S. and relevant international codes and standards. The project team will insure that consistent standards are used in all of the project regions. Some rural installations in Bolivia have been made using U.S. REA standards. For example CRE in Santa Cruz uses the REA standards, and has a good formalized procedure that can be documented and adopted as a national standard approach.

Once feasibility has been determined for a specific rural generation project site, and funding has been authorized, formal competitive bidding will be employed for all hardware and services, and contractors and equipment selected on their best meeting the specification criteria first, and price secondly.

The NRECA team will appoint a project monitor for each construction activity who will function as the "owner's" engineer, a function that will later be transferred into ( EFER ) as a needed function to protect the Bank's interests. Each project will be treated as a commercial construction project with quality control activities employed as needed, a full documentation of complete construction activities, as-built drawings produced by the contractors, training activities conducted by selected contractors, and a formal acceptance process that must be completed before a specified holdback of a percentage of the contracted funds are released.

The NRECA team will have as its intent to transfer the skills necessary to complete such a generation project successfully on-time, and within budget, to the necessary cooperative and ( EFER ) staff. Short-term experts, both local and expatriate will be employed to guarantee that the necessary skills are available where and when needed. Such actions as prequalification lists for potential hardware suppliers and construction services providers will be accomplished by the NRECA team so as to keep tight management control over the whole generation construction project process from start of design to commissioning and acceptance. Operation and maintenance procedures will be formalized and written into loan agreements, and spot checks of operating systems will be made to check conformance with the formal written O & M plan. The entire project design and implementation process will be aimed at sustainable success.

## ILLUSTRATION OF DAM METHODOLOGY

### INTRODUCTION

The economic feasibility of rural electrification is mainly driven by demand conditions at specific sites. Hence the economic feasibility of ADREP cannot be determined in a general analysis, since the specific investment sites are not as yet identified. However, a representative analysis can be provided, based on the results of a recent study done by NRECA utilizing the Demand Assessment and Site Selection Methodology (DAM) of a proposed rural electrification project in Bolivia. This methodology uses standard cost-benefit analysis for economic analysis of rural electrification, but has many specially-tailored features for determining probable economic development attributable to rural electric investment in a given location. Since it is highly site-specific, it can be used to cull out unfeasible project sites, and therefore "builds-in" economic feasibility to the ADREP on the basis of selectivity. This annex represents a summary of this study as an illustration of how NRECA's appraisal methodology (DAM) is to be applied in the ADREP to ensure economic feasibility prior to commitment of funds.

### BACKGROUND

In 1990, NRECA collaborated with the World Bank, UNDP, and the UNFDAC Mission in Bolivia to demonstrate a new method of determining the feasibility of rural electrification projects in Bolivia. UNFDAC was in the process of developing a rural electrification subcomponent as a part of a multi-faceted development project in the Asunta Valley a region of the Yungas that is heavily cropped with coca. NRECA, working with the Energy Sector Management Assistance Program of the World Bank/UNDP on an overview of rural power development in Bolivia, identified serious weaknesses in the

technical analysis of the project that had been done to date. Costs were based on dated information and were unrealistically low. Demand both in terms of numbers of users and usage levels appeared to be overstated. Additionally, a quick inspection of the engineering work that had been done indicated that design modifications could be integrated to achieve cost reductions. As part of a prefeasibility-level study that NRECA proposed to do in order to correct these problems, the Demand Assessment Model was applied for the purpose of determining whether there was a sufficient economic demand to justify rural electrification. Complementary engineering analysis was done to establish an optimal approach to supplying the valley with electricity, as well as an overview of the management capability of the local distribution entity, the Cooperativa de los Yungas (CEY), to take on the project. The study produced a report that has been published by the ESMAP and recently presented to the Government of Bolivia.

#### SUMMARY OF ANALYSES

In developing an optimal system for meeting UNFDAC's needs, the study was based on several scenarios, beginning with the system as designed by UNFDAC's original consultant but with corrected cost estimate, a second scenario which was the same as the first, but with modified (lower) demand estimates, a completely modified system using lower-cost engineering methods and the lower demand estimate, and another modified design which included a small hydroelectric station. Two other plans involving decentralized hydroelectric resources as the only source of energy were also considered, but since the client, UNFDAC, insisted on a full area coverage system, the decentralized options were ruled out. Table 1 presents a summary of the four principal scenarios.

Detailed analysis of residential and productive demand in the Valley was carried out by means of surveys conducted throughout the valley, resulting in estimates for first-year house connections (Table 2); types of existing and potential productive uses ( see Table III-1, pag. 24 of main text) based on a wide range of considerations including local and external demand for goods and services that could be produced in the zone, other infrastructure such as roads, and observed experiences and activities in the area and in similar electrified areas in the Yungas; and an estimate of productive end-uses, with both a "probable" and an "optimistic" forecast (Table 3). Each use was assigned average consumption characteristics and economic values (Table III-1), following the methodology presented above. Average consumption and economic values were also determined for residential users. From all of these data, compiled estimates of consumers and demand were then

---

Bolivia: Prefeasibility Evaluation, Rural Electrification and Demand Assessment, (Report No. 129/91).

calculable (Table 4).

## RESULTS

The economic cost for energy supplied by the grid was also calculated, and from this point, standard cost-benefit calculations using discounted cash-flow analysis was then used to determine the economic feasibility, using operating revenues based on the tariff system.

The analysis showed that none of the options was feasible in a financial sense, although all of the scenarios had positive economic returns, the highest being for Scenario 2. In financial terms, the project built along these lines showed that the project could recover only 35% of the capital cost, given the tariff assumption in the analysis. Breakeven could be achieved by adjusting the tariff, raising equity for construction from the recipient population, receiving a grant from public treasury resources, or most likely, a combination of these measures.

Table 1: SUMMARY COMPARISON OF ALTERNATIVES Ia, Ib, II, and III\*

Item	Ia	Ib	II	III
Number of Consumers (projected)	7,384	3,672	3,672	3,672
Peak Demand, kW	2,886	946	946	946
Primary Distribution line, kms	132	132	132	132
Secondary Line, kms	130	64.5	64.5	64.5
Meters and Services	6,498	3,224	3,224	3,244
Transformer Capacity, kva	5,772	1,892	1,892	1,892
Generating plant, kW	0	0	0	300
Construction Cost	\$ 2,005,000	1,433,270	1,077,270	1,569,270
Engineering and Admin. 15%	300,750	214,990	161,600	253,390
Contingencies, 10%	200,500	143,330	107,730	156,330
	<u>\$ 2,506,250</u>	<u>1,791,590</u>	<u>1,346,600</u>	<u>1,979,390</u>

\* For each of the alternatives presented, there are 132 kilometers of primary three phase or single-phase lines. Differences in cost result from varying the type of line or size of conductor.

**Table 2: COMMUNITIES IN PROJECT AREA  
HOUSE COUNT AND EXPECTED CONNECTIONS**

Villa Remedios	60	23
Tajma	100	60
Pastopata	75	55
Colopampa (Nucleo Escolar)	6	0
Arrozal	18	12
Choquechaca	7	15
Villa Barrientos	52	46
Centro tocoroni	20	9
Concha Grande	20	9
Concha Centro	20	9
Totora Pampa	11	2
Cruce de Mercedes	17	6
Las Mercedes	100	73
Totora Chica	22	9
Totora Grande	40	18
La Calzada	100	73
Santa Rosa	60	55
Colopampa Grande	60	28
Playa Ancha	12	0
Yanamayo	75	37
Chamaca	60	32
Charobamba	27	14
Charoplaya	67	41
Callisaya	55	28
Copalani	25	14
Guayabal	8	3
Asunta	250	165
Charia	40	18
Pichari	30	9
Los Olivos	10	5
Cotapata	35	18
Quinuni	60	4
Santiago Tocaroni	35	9
Santiago Chico	6	4
Villa Santiago	17	9
Santiago Siete Lomas	11	5
Incapucara	15	7
San Juan	32	18
Marquirivi	5	5
	<u>1,678</u>	<u>937</u>

**Source:** Mission assessment.

Table 3: ESTIMATED NUMBER OF CONSUMERS

	<u>Probable</u>		<u>Optimistic</u>	
	YEAR 1	YEAR 30	YEAR 1	YEAR 30
Residential Consumers	937	3,000	937	3,000
Productive Use Consumers (including public lighting units)	202	672	253	1,136
Total Consumers	1,139	3,672	1,190	4,136

Source: Mission assessment

Table 4: DEMAND ESTIMATE (KW)\*

	<u>Probable</u>		<u>Optimistic</u>	
	YEAR 1	YEAR 30	YEAR 1	YEAR 30
Demand in kW	198	947	243	1,313

\* Development of composite kW demand figures are explained in Chapter IV and are based on demand tables adapted to Bolivia

Source: Mission assessment.



## ANNEX B

### CONCEPTUAL DESIGN FOR LONG TERM SUSTAINABILITY SUPPORT

In parallel with the other project activities, a cooperative finance company tentatively referred to as the Empresa Financiera de Electrificación Rural (EFER) will be formed. EFER's purpose is to provide a sustainable financing entity for rural electrification project loans as well as a conduit for grant funds which may be made available from time to time by the GOB or other donor agency. EFER would also function as a service organization offering training to its members and oversight of both administration and technical operations in defense of its security interest. The exact structure and attributes of EFER would be worked out during the first year of ADREP activity, but a possible structure has been discussed with the members of ANALEC (the National Association of Electric Utilities), as well as the Ministries of Planning and Energy. Details have not been worked out, but no fatal flaws have been uncovered, and expressions of support have been received. Following is an initial description of how EFER might operate. It should be emphasized that this description is preliminary and much work remains to be done to obtain the consensus necessary to finalize it.

#### EFER Purpose

EFER is a cooperative finance company organized under the laws of Bolivia as a private organization, member owned and not-for-profit. EFER's purpose is to provide a sustainable financing entity for rural electrification project loans for system construction as well as customer service equipment. Projects proposed would be evaluated for financial feasibility using a consistent, objective evaluation tool called the Distribution Assessment Modem (DAM). Funding packages would be structured with a combination of debt and grant financing depending on the outcome of the assessment process.

EFER would be allowed to loan funds for distribution system or generation plant construction, and customer service equipment (meters, etc.) All loans would be made to members. Loans for reloan by members for such things as a customer productive uses equipment could be made, but security for such loans would be supported by the member not the ultimate retail customer.

Since EFER is intended to provide sustainable financing arrangements through continuing access to international lending institutions at interest rates consistent with "investment grade" debt, it will have to develop a significant equity position. This is not inconsistent with EFER's not-for-profit status, although it will appear that EFER is "making money" on its loans. Such means as revolving funds, Capital Term Certificates (CTCs) and other equity generation schemes would leverage initial seed equity capital provided by a grant from AID or other agency. All equity

would be held as patronage capital in the name of members, and it is possible that at some future date, capital credits may be retired.

In addition, EFER would function as a service organization, providing training to borrower personnel in system operation/management, as well as productive uses promotion. From time to time, EFER might involve itself in other areas deemed necessary to strengthen the performance of the subsector, in the interest of protecting EFER's security position.

#### EFER Structure

All entities distribution electricity to rural Bolivia are eligible to become members, except wholly owned agencies of the government (regional development corporations of ENDE, mainly). This is to minimize connections with the political process, and to make security arrangements easier (EFER's ability to exercise mortgage rights on a government entity would be limited, for instance).

EFER would be governed by a nine member board composed as follows:

Six trustees elected by region, three of whom must be associated with an electricity distributor (management or board member) and three of whom must represent regional development corporations.

Three trustees chosen by members at large who must be external to the electric industry. Candidates would preferable be from the financial community. External trustees would not be allowed to have business dealings with EFER or members in any way that might constitute a conflict of interest, i.e. as a vendor of equipment or a recipient of a member loan for productive uses equipment.

It may seem incongruous that regional development corporations are, on the one hand excluded from membership as political entities, and on the other, included on the board of trustees. The rationale for including them on the board is that the RDCs are a significant force for development in rural Bolivia and it is essential that EFER's activities be coordinated with theirs. This does not mean that EFER should lend money for RDC projects, as would occur were they embers, due to the security problems alluded to earlier.

#### EFER Funding

EFER funding could come from four sources:

- 1) Member dues could pay for normal operations i.e. staffing, transportation, office space, utilities, etc.
- 2) Seed capital in the form of a grant from AID. These funds

would form the initial equity capital and an endowment whose interest could be used for feasibility studies, etc.

- 3) Borrowed capital from private or public national and international lending agencies. International funds would be made available by the Central Bank at near cost, or obtained directly from private sources, since they would not carry a government loan guarantee.

It is the objective of EFER to provide such security to international lenders that no government guarantees would be required.

- 4) Grant funds, national and international, from donor agencies. These grant funds would be used by EFER as subsidies when required by otherwise desirable projects. Such funds would be acquired through the efforts of EFER staff, and may have conditions governing their use. EFER would, to the extent possible within these conditions, allocate such grant funds on an optimum basis based upon project assessment using the DAM.

In order to provide a continuing growth of equity, necessary to achieve preferred borrower status in the international market, EFER would retain a portion of loan proceeds as "Capital Term Certificates" (CTCs). This would be a form of required investment in EFER. The borrower would receive 95% of the loan proceeds but make payments amortizing 100%. The remaining 5% would be held by EFER, paying a low interest rate, but included as a patronage capital allocated to the borrower.

#### EFER Security

EFER's security for borrowed funds could be of various forms:

- 1) A first mortgage against all the assets of the borrower.
- 2) Preemptive authority over tariffs charged for sale of electricity. No other entity in Bolivia could order a tariff lower than that considered by EFER as necessary to recover its loan funds. Such tariff preemption applies to the whole of the borrower's system, not just the portion financed by EFER.
- 3) Bank guarantee.
- 4) A "Fideicomiso" or similar priority fund capture arrangement.

In order to protect its security interest EFER would:

- 1) Establish accounting and reporting rules for all borrowers.
- 2) Establish construction standards for projects built with EFER

funds, with an eye to ensuring that the construction can be economically maintained throughout the life of the loan.

- 3) Maintain a system of regional offices staffed with an auditor and an engineer charged with overseeing and assisting borrowers to meet the accounting and engineering standards.

#### Other Services

In order to protect its long-term interest, EFER would conduct training programs for borrowers in several key areas.

The most important of these areas are:

- 1) Accounting
- 2) System operation/engineering
- 3) Management
- 4) Productive Uses. in the early years of the enterprise, productive uses programs would be administered directly by EFER, but it would be the intent of the program for borrower personnel to be trained in this area as quickly as possible, so that EFER's activities would consist of training and evaluation.

EFER would conduct periodic management audits and assist in restructuring studies depending upon its view of the financial performance of the borrower.

## EFER National Policy Issues

In order for EFER to function as designed, with access to low cost credit, some national policy changes will be required. The most important of these is in the tariff control area. As noted above, one of the principal securities for EFER loans is the right to order tariffs for a borrowers system if, in the judgement of EFER, the tariffs being charged do not permit recovery of EFER money. This is in conflict with the duties of DINE and would require DINE's acceptance of a coordinated tariff authority. It is not the interest of EFER to control tariff levels or rate design, merely ensure that tariffs are sufficient to repay loans. DINE authority would therefore remain intact for all normal utility activity and, in the event DINE approved tariffs were adequate, no EFER action would be necessary. DINE acceptance of the tariff preemption issue could take a number of forms.

- o DINE could approve each loan package as it is prepared. This would give EFER specific authority over the borrower during the course of that loan package. It would give DINE the ability to act politically with regard to loan approval, though, which could be a problem as personnel change.
- o DINE could support the passage of a decree guaranteeing all utilities sufficient tariffs to meet their obligations which would automatically cover EFER. There could be problems with interpretation in the future however.
- o A decree could be obtained when EFER were formed specifically authorizing it to order tariffs sufficient to recover its loans. This may be the most difficult to achieve politically, but would probably offer the greatest security against future political changes.

While these issues have not been fully resolved, conversations have occurred and the matter does not appear to be insurmountable. DINE is fully aware of the need to provide the international investment market with adequate assurance of repayment if there is any hope of achieving the goal of the project, which is to obtain low cost financing for rural electrification projects.

Additional policy issues which require attention are as follows:

- o A Memorandum of Understanding (MOU) or bilateral agreement with the Ministry of Planning will be necessary to permit access to local currency funds dedicated by USAID to the ADREP project as a whole. In future, local currency funds made available by any donor agency will also require the same sort of arrangement. A blanket MOU covering procedures under which such funds would be made available should be negotiated prior to EFER startup to guard against the effects of political changes at the Ministry.

- o The issue of participation in EFER by the GOB or some subdivision thereof needs to be resolved. While, ideally, EFER should be a totally private organization, all electric utilities in Bolivia have some participation by the GOB (except CRE), so some level of government involvement is assured. This issue has been discussed with all the entities involved and has yet to be fully resolved. This is particularly important in the matter of ENDE participation. While ENDE is nominally a stock company, all stock is held by the GOB, making it as subject to political pressure as any other agency. ENDE is the largest utility in the country, however, and undertakes some important RE projects. The issue of ENDE participation relates mainly to security on loans and political influence on operations. It may be that a formula allowing ENDE to participate would include special guarantee arrangements and a limit on loan amounts. The issue of political influence should be taken care of by the unitary representation formula, i.e. one member-one vote.
- o Equipment imported under EFER loans should receive preferred treatment with regard to import duties. Electric utility equipment is normally imported duty free when obtained for a project such as the AID Phase I and II RE projects, but such imports require a long administrative process, and are normally not worth pursuing except for large purchases.
- o One of the problems with previous international financing packages is that they have had to go through the Banco Central where significant interest adders have been tacked on, making the packages prohibitively expensive. A recent IDB financing for CRE was granted by IDB at 9%, but actually arrived at CRE at 11%. It is the goal of EFER to obtain financing without a need of GOB guarantees, so the issue of interest markup by the Banco Central should not be a difficult one to resolve.
- o Though not a policy issue, per se, it should be noted that, as EFER will function as a financial institution, may be subject to regulation by the Superintendent of Banks in the same fashion as other mutual banking associations such as La Primera, etc. Since EFER will not accept deposits from the public, it will not be a true bank and may be exempt from regulation. As a cooperative, it will have to register with INALCO.

Resolution of these various issues has not yet been achieved, due to the time involved in negotiating the necessary agreements. It will be the task of one of the project team specialists to obtain the necessary commitments from the various agencies during the course of the project's first year. This will not be a simple process. It has been determined by FEBOPI that a total of over 160 separate approval processes lasting at least a year are required to start any business in Bolivia.

With the turndown in mining activities in Bolivia, some existing hydro capacity was abandoned, or is out of service, that could be rehabilitated and put back into service for some productive purpose. COBEE has been offered these sites and plants to include in their hydro production network. COBEE has indicated however that their capacity expansion plan which is scheduled to provide 60mw of new hydro capacity through 1995 has 6 projects with an average cost of about \$1250. per kw installed. They are not interested in the relatively smaller unit capacities found in the now out-of-service mining power plants.

There are reportedly up to five of the mining hydropower plants available with a unit capacity estimated at 1000kw to 2000kw with the total capacity available unknown. At this size such plants could be excellent resources for rural electrification activities. The project team will early on verify the availability of these plants and if available, proceed with a thorough project identification activity.

The evaluation study would consist of three basic elements:

- a) A plant by plant site specific evaluation would define the condition of all of the plant components from dam to powerhouse tailrace, and to produce or verify the cost to put the plant back into service;
- b) A power demand market survey in the region within reasonable transmission distance from the powerhouse could determine whether or not a viable stand-alone project can be put together within the technical and financial constraints defined.
- c) A power wheeling potential survey will be made to determine if an arrangement can be accomplished that would allow power from these hydro plants to be essentially traded for a power take-off at another location suited for servicing rural projects.

If viable projects are indicated, the project team will complete the formal process of requesting that the title to the existing plant assets be turned over to EFER prior to starting any actual project implementation. The asset value of the plants would then become equivalent to equity that EFER could invest in any following projects. Such assets would nicely complement the initial U.S.AID cash contribution, and could possibly become prime sources of electricity for ADREP rural electricity projects.

The first ADREP activity however, is to verify availability before any manhours or cash are expended on the three elements above. The project team will consult with COMIBOL, the Ministry of Energy, and other relevant sources to verify such availability in both the public and private mining sectors. COMIBOL, for example,

is known to have a seven plant, 16MW system already connected with ENDE, which sold roughly 20% of its 104,000mwh produced in 1990 to ENDE.



ANNEX C

ILLUSTRATIVE MEMORANDUM OF UNDERSTANDING SIGNED BY NRECA, GOB, AND USAID

Memorandum de Entendimiento para el Programa de Electrificación Rural en Bolivia.

Memorandum of Understanding for the Rural Electrification Program in Bolivia.

ARTICULO I Estipulaciones Generales

ARTICLE I General Provision

El propósito de este Memorandum de Entendimiento es establecer un acuerdo general entre el Gobierno de Bolivia (GOB) y la Asociación Nacional de Cooperativas Rurales de Electricidad de los Estados Unidos (NRECA), de aquí en adelante denominada "Las Partes", con relación a la implementación de un convenio de cooperación entre NRECA y la Agencia para el Desarrollo Internacional de los Estados Unidos (AID), para el desarrollo de un proyecto de electrificación rural ("Proyecto") en Bolivia.

The purpose of this Memorandum of Understanding is to establish a general agreement between the Government of Bolivia (GOB) and the National Rural Electric Cooperative Association (NRECA), hereinafter referred to as "the Parties," regarding the implementation of a cooperative agreement between NRECA and the U.S. Agency for International Development (AID) to carry out a rural electrification project ("Project") in Bolivia.

Este Proyecto, denominado "Proyecto de Electrificación Rural para el Desarrollo Alternativo" está estrechamente relacionado y será llevado a cabo en coordinación con los Programas de asistencia para el Desarrollo Alternativo del GOB con el fin de proporcionar a la población una alternativa para su desarrollo económico que ponga fin a su participación en la economía ilegal de la coca. Por lo tanto, es esencial una estrecha colaboración con las entidades del GOB y actividades relativos. Igualmente importante es la coordinación con las autoridades del GOB encargadas de efectivizar la política de electrificación rural ya que el Proyecto también enfatizará el uso sostenido de las inversiones en electrificación rural.

The Project, entitled "Alternative Development Rural Electrification Project", is closely related and will be carried out in parallel to the GOB's Alternative Development Program aimed at providing alternative economic development for populations ending their participation in the illegal coca economy. Close coordination with GOB Alternative Development entities and activities is therefore essential. The Project will also emphasize sustainability issues for rural electrification investments and so coordination with rural electrification policy-making authorities of the GOB is equally important.

Luego de firmar este acuerdo, el Ministerio de Planificación y Coordinación, representante debidamente autorizado del GOB, informará a NRECA de otros representantes autorizados adicionales y sus responsabilidades en la implementación del Proyecto.

## ARTICULO II. El Convenio

Las Partes arriba mencionada, por este medio acuerdan desarrollar conjuntamente el Proyecto objeto de este convenio, según los términos y condiciones aquí establecidos.

## ARTICULO III. El Proyecto

### A. Descripción General

El Proyecto proporcionará desarrollo institucional y asistencia técnica para el desarrollo de la electrificación rural en Bolivia. Desarrollo de demostraciones para el uso de la electricidad, apoyo crediticio a los consumidores, y otras iniciativas que motiven el uso de la electricidad en Bolivia, y la adquisición de equipo para la construcción de sistemas eléctricos rurales en áreas seleccionadas en Bolivia. El proyecto comenzará el 1o. de -- y terminará el --

### B. Fuente de Financiamiento y Costos

Las Partes de este Memorandum de Entendimiento convienen que los fondos para el Proyecto consistirán de fondos en Dólares, los cuales provendrán del referido acuerdo de cooperación entre NRECA/AID, y la contribución del GOB para el Proyecto será de aproximadamente \$ -- millones en moneda local provenientes del

Upon concluding this agreement, the Ministry of Planning and Coordination the duly authorized representative of the GOB, will inform NRECA of additional authorized representatives of the GOB and in what capacity they will assist in the implementation of the Project.

## ARTICLE II. The Agreement

The above named parties hereby mutually agree to carry out the project which is the subject of this agreement in accordance with the terms and conditions set forth herein.

## ARTICLE III. The Project

### A. General Description

The Project will provide for institutional development and technical support for rural electrification development in Bolivia, the development of electricity-use demonstrations, consumer credit support, and other initiatives to encourage the productive use of electricity in Bolivia, and for the procurement of rural electric equipment and construction of rural electric systems in selected areas of Bolivia. The Project will commence on -- and will terminate on ---

### B. Source of Funding and Cost

The parties to this MOU agree that the funds for the Project will consist of U.S. Dollar funds to be provided from the referenced NRECA/AID cooperative agreement, and a GOB counterpart contribution to the project equivalent to approximately \$ --

programa de moneda local de los Estados Unidos. Se estima que el costo total para los cinco años de duración del Proyecto será de \$ -- millones, incluyendo \$ -- millones con fondos en Dólares de los Estados Unidos, y \$ -- millones con fondos en moneda local.

#### ARTICULO IV. Responsabilidades

##### A. NRECA

Con los \$ -- millones en fondos de AID que están disponibles bajo el acuerdo en referencia, NRECA conviene en proporcionar al GOB lo siguiente:

1. Una donación de Ayuda en bienes importados de aproximadamente \$ -- millones para la construcción de líneas;

2. Desarrollo institucional, capacitación y asistencia técnica para la implementación del Proyecto; y

3. Cualquier otra asistencia determinada mutuamente por las Partes de este convenio.

##### B. GOB

El GOB acuerda proporcionar o hacer que se lleve a cabo lo siguiente:

1. Los fondos de contrapartida en moneda local estimados en el Artículo II de este acuerdo;

2. Acciones expeditas y colaborativas de políticas claves requeridas, como se describe en el Anexo a este Convenio, asegurando apoyo técnico y financiero estable, racional y permanente para las entidades que operen en el proyecto de electrificación rural

million in local currency. The total project cost over the five-year period is estimated to be \$-- million, including \$-- million in U.S. Dollar funds and the estimated \$-- million in local currency funds.

#### ARTICLE IV. Responsibilities

##### A. NRECA

With the \$ -- million in AID funds made available under the referenced agreement, NRECA agrees to provide to the GOB the following:

1. A Grant-in-Aid of imported commodities totaling approximately \$ -- million for system construction;

2. Institutional development, training, and technical assistance for the implementation for the Project; and

3. Other assistance as mutually determined by the parties to this agreement.

##### B. GOB

The GOB agrees to provide or cause to be carried out the following:

1. Local currency counterpart funding as estimated under Article II of this agreement;

2. Prompt and collaborative action on key policy requirements, as described in the Annex to this Agreement, for ensuring stable, rational and permanent financial and technical support for rural electrification

en Bolivia;

3. Participación del GOB a través del personal de las agencias implementadoras en estudios técnicos, actividades de planificación, capacitación, actividades administrativas, u otras actividades desarrolladas bajo el Proyecto;

4. Contribuciones en especie dirigido a satisfacer el requisito de contribución de fondos de contrapartida en moneda local del GOB bajo este convenio; y

5. Todas las acciones necesarias requeridas para agilizar los trámites aduanales de todos los materiales y equipos adquiridos bajo el Proyecto.

6. Cualquier otra asistencia que mutuamente pueda determinarse por las Partes de este Convenio.

ARTICULO V. Destino de los Artículos Importados

NRECA retendrá la propiedad de los bienes bajo este Convenio hasta la terminación de las actividades del Proyecto. Al finalizar el Proyecto, los bienes financiados e importados por AID que no hayan sido instalados en el sistema eléctrico rural, serán devueltos a AID para su disposición final tal como lo determinan las regulaciones del Gobierno de los Estados Unidos de Norteamérica; posteriormente, el título de propiedad de dichos bienes serán transferidos al GOB.

operating entities in Bolivia;

3. Counterpart participation by personnel of the appropriate implementing agencies in technical studies, planning activities, training, administrative activities, or other activities carried out under the Project;

4. In-kind contributions toward satisfying the local currency counterpart contribution requirement of the GOB under this agreement; and

5. All necessary actions required to expedite the clearance through customs of all commodities and equipment purchased under the Project.

6. Other assistance as may be mutually determined by the Parties to this Agreement.

ARTICLE V. Disposition of Imported Commodities

NRECA will have use of property financed under this Agreement until the termination of Project activities. Upon termination of the Project, AID-financed and imported property, other than goods installed on the rural electric systems, will be returned to AID for final disposition as provided by standard U.S. Government regulations; furthermore, title to AID-financed goods imported for rural electric systems will be vested in the recipient entities.

ARTICULO VI. Estipulaciones Administrativas y Especiales

A. Planes de Acción Anuales

Las actividades específicas del Proyecto así como calendario de éstas, las cuales son financiadas en Moneda Local, serán determinadas de común acuerdo por las Partes, en base a un plan de acción anual que estará sujeto a la aprobación del GOB y AID.

B. Dispensa de Impuestos de Importación

La adquisición de cualquier artículo financiado bajo este Proyecto estará libre de todo impuesto y costo de importación bajo las leyes vigentes en el territorio del GOB.

C. Informes

El beneficiario que reciba los artículos adquiridos bajo el Proyecto, proporcionará un informe mensual a NRECA y MINPLAN detallando la localización y estado de los artículos importados para la construcción de los sistemas eléctricos rurales. Dichos informes serán incorporados en los reportes que NRECA suministrará a AID sobre el estado intermedio y los resultados finales del Proyecto.

ARTICULO VII. Anexos

A. Descripción del Proyecto

Una descripción del proyecto indicando los objetivos, actividades, regulaciones para su implementación general y la política requerida para el Proyecto de Electrificación Rural para el Desarrollo Alternativo se adjunta y forma parte de este Convenio.

ARTICLE VI. Administrative and Special Provisions

A. Annual Action Plans

The specific project activities as well as the timing of such, that are funded under the local currency portion will be determined jointly by the Parties on the basis of comprehensive 12-month action plans for submission to the GOB and AID for approval.

B. Import Taxation Waiver

Any commodity procurement financed under the Project will be free from any import duties or fees imposed under laws in effect in the territory of the GOB.

C. Reporting

The recipient of transferred commodities will provide monthly reports to NRECA and MINPLAN giving detailed information regarding the allocation and status of project commodities imported by NRECA for rural electric system construction. Such reports will be incorporated into comprehensive reports to be provided by NRECA to AID on the intermediate status and final results of the Project.

ARTICLE VII. Annexes

A. Project Description

A project description providing the objectives, activities, general implementation provisions and policy requirements for the Alternative Development Rural Electrification Project is attached to and forms part of this agreement.

B. Cuadro Financiero Ilustrativo

Se anexa un cuadro financiero ilustrativo como parte de este convenio:

EN FE DE LO CUAL, el GOB y NRECA, actuando cada uno de ellos por medio de sus representantes debidamente autorizados, han convenido firmar este Memorandum de Entendimiento, en esta ciudad, en sus nombres, en el día, mes y año señalados por escrito al comienzo de este documento.

Signed:

\_\_\_\_\_  
(Representative's name and title)  
Ministry of Planning and Coordination  
REPUBLICA DE BOLIVIA

Acknowledged by:

\_\_\_\_\_  
(Representative's name and title)  
U.S. Agency for International  
Development/Bolivia

B. Illustrative Financial Table

An Illustrative Financial Table is attached to and forms part of this agreement.

IN WITNESS WHEREOF, the GOB and NRECA, each acting through its duly authorized representative, have caused this Memorandum of Understanding to be signed in their names and delivered in Bolivia on the date shown in the first page of this document.

\_\_\_\_\_  
Bob Bergland  
Executive Vice-President  
National Rural Electric  
Cooperative Association

ANNEX D

Project Logical Framework Bolivia Alternative Development Rural Electrification  
Project-Life of Project Activities

Narrative	Verifiable Indicators	Verification Means	Key Assumptions
<b>Project Goal</b>			
Provide RE infrastructure inputs to support GOB/AID goal of reducing coca dependency through Alternative Development	Wider Availability of electricity in Alternative Development target zones  Increased productive use of electricity in Alternate Development target zones	Baseline data  Construction reports   Utility reports	National and Utility priorities include development in target areas  Complementary investment, including other productive infrastructure occurs
<b>Project Purpose</b>			
Direct investment in selected RE projects in Alternative Development target projects	Expand productive uses of electricity in rural industry    10,000 new customers served by project facilities	Utility records      Construction reports	Counterpart utilities cooperate  Customers respond to promotion  Complementary productive infrastructure investments made by other agencies  Utility Cooperation  Adequate local currency resources available

Narative	Verifiable Indicators	Verifiable Means	Key Assumptions
Project Purpose (cont)			
Establish sustainable mechanism for rational RE planning construction and operation	<p>Conduct training in utility technical and financial operations at utilites serving Alt. Devel. target zones</p> <p>Introduce rational method of project evaluation based upon objective assessment of economic feasibility</p> <p>Establish institution for rational, sustained RE funding, planning and operation support</p> <p>Leverage AID project funds</p>	<p>Project reports</p> <p>Project reports</p> <p>Project Reports</p> <p>Project Reports</p>	<p>Utility cooperation</p> <p>Utility cooperation and GOB/AID support for non-political project selection method</p> <p>GOB/NRECA agreement reachable on key policy issues: Tariffs, Pvt sector involvement, security</p> <p>Other lending institutions or donors willing to collaborate</p>
Project Outputs			
<p>Site Analysis</p> <p>A. Initial national rural electrification site screening-- consistent with ADP priorities</p>	<p>- Geographic screening completed for up to 5 areas</p> <p>- Rural Electrification &amp; regional development plans evaluated</p>	<p>- Screening report</p> <p>- AID &amp; Gov't approve selection</p>	<p>Project start-up timely &amp; priorities allow first year screening.</p>



Narrative	Verifiable Indicators	Verifiable Means	Key Assumptions
Project Outputs (cont.)			
<p>B. Baseline data &amp; initial analysis completed as input to final utility &amp; area selection for sub-projects and application of Demand Assessment Model</p>	<ul style="list-style-type: none"> <li>- Completed surveys of existing electric &amp; non-electric energy end-uses in 5 project areas One/year</li> <li>- Completed electric &amp; non-electric energy use equipment-technology cost &amp; characteristics review updated annually</li> <li>- Completed analyses of existing &amp; prospective productive uses for each priority area</li> <li>- Completed analysis of existing household uses &amp; cost-benefit for electricity vs. alternatives</li> </ul>	<ul style="list-style-type: none"> <li>- Survey Reports</li> <li>- Technology characteristics reports and updates</li> <li>- Comparative productive uses reports</li> <li>- Reports on household end-uses &amp; report on cost-benefit for electricity vs. alternatives</li> </ul>	<ul style="list-style-type: none"> <li>- Gov't counterpart &amp; utility agreement to cooperate.</li> <li>- Timely availability of TA personnel, cooperation of vendors &amp; availability of data in timely manner.</li> <li>- Utilities agreements to cooperate, INE coop., availability of local survey staff, &amp; local gov't cooper.</li> <li>- Availability of rural household survey data from INE in timely manner, INE coop. on design, utilities coop. re: data on use &amp; prior loan studies</li> </ul>

Narrative	Verifiable Indicators	Verification Means	Key Assumptions
Project Outputs (cont)			
<p>C. Site area definition and project design for electrification project analysis</p>	<ul style="list-style-type: none"> <li>- Review &amp; evaluation of RE &amp; productive uses opportunities for urban, semi-urban &amp; rural areas of selected utilities annually</li> <li>- Household baseline surveys for site options at 5 project areas-one/YR.</li> <li>- Productive use surveys &amp; analysis for site options annually</li> <li>- Review plans &amp; coord. with development planning agencies</li> <li>- Analyses of prospective pop. &amp; economic growth &amp; developmt plans in each proj. area</li> </ul>	<ul style="list-style-type: none"> <li>- Priority area selection reports</li> <li>- Baseline household survey reports</li> <li>- Productive use analysis reports</li> <li>- Minutes of meeting &amp; text of any agreements.</li> <li>- Input to household &amp; productive uses reports</li> </ul>	<ul style="list-style-type: none"> <li>-INE, Utility, Devel Corp. cooperation.</li> <li>- Complementary investment in other productive infrastructure occurs</li> <li>- Utility, INE &amp; Devel Corp cooperation; availability of trained survey staff.</li> <li>- Same as above plus IBTA.</li> <li>- Cooperation of devel agencies &amp; Ministry of Planning.</li> <li>- Timely availability of economic &amp; population statistics from Gov't</li> </ul>
<p>D. Demand Assessment Site Evaluation</p>	<ul style="list-style-type: none"> <li>- Complete any necessary modif. of model for applic. to Bolivia.</li> <li>- Finalize technical &amp; economic assumptions for subprojects. Repeat annually in new proj. area</li> <li>- Determine source &amp; cost of financing, &amp; determine tariffs requirements.</li> </ul>	<ul style="list-style-type: none"> <li>- Modified model</li> <li>- Sub-project reports.</li> <li>- Sub-project reports.</li> </ul>	<ul style="list-style-type: none"> <li>- Availability of CARES staff to assist in modification</li> <li>- Timely TA staffing for project &amp; construction standards determination.</li> <li>- Utility agreemt. on finance assumptions &amp; supply of tariff information.</li> </ul>

Narrative	Verifiable Indicators	Verification Means	Key Assumptions
Project Outputs (cont)			
<p>E. Application of Demand Assessment Model to various sub-Projects and preparation of project rankings. Development Areas</p>	<ul style="list-style-type: none"> <li>- Estimates of systems design &amp; costs prepared for five project areas, one/yr</li> <li>- Financing terms determined and tariffs for sites in each of 5 project areas</li> <li>- End-use data incorporated and projections prepared in each of five project areas</li> <li>- DAI model output and evaluation of target sites for each of 5 project areas</li> </ul>	<ul style="list-style-type: none"> <li>- For each site area demand assessment report prepared</li> </ul>	<ul style="list-style-type: none"> <li>- Demand assessment model modified for Bolivia, utilities cooperate on sites selection, and tariff assumptions and projections.</li> <li>- Complementary investment in other productive infrastructure occurs</li> </ul>

Narrative	Verifiable Indicators	Verification Means	Key Assumptions
Project Outputs (cont)			
<b>F. Productive Uses Promotion</b>  1. Utility personnel training	<ul style="list-style-type: none"> <li>-Five utilities in Bolivia assign full time promotion persons</li>   <li>-Three weeks training supplied by project staff at each utility</li> </ul>	<ul style="list-style-type: none"> <li>-Project reports</li> </ul>	<ul style="list-style-type: none"> <li>-Utility cooperation and approval of DAM output for project sites</li> </ul>
2. Project Promotion in field	<ul style="list-style-type: none"> <li>-200 contacts made with prospective users by project staff and/or utility personnel for each utility participating</li>   <li>-Demonstration setups for 2 most important productive uses established in each utility</li>   <li>-Contact made with other development agency to coordinate promotion in each utility area</li> </ul>	<ul style="list-style-type: none"> <li>-Project reports</li> </ul>	<ul style="list-style-type: none"> <li>-Utilities provide transportation for own personnel</li>   <li>-AID approves project fund use for demo equipment</li>   <li>-Other agencies available and interested</li> </ul>

Narrative	Verifiable Indicators	Verification Means	Key Assumptions
Project Outputs (cont)			
<b>C. Construction Activities- Productive Uses</b>  1. Construction and equipment standards preparation	-Completed analysis of existing equipment and capital vs. efficiency optimization  -Completed utility installation standards analysis	-Analysis report  -Analysis report	-Data available from manufacturers  -Utility cooperation
2. Procurement	-Materials lists and specifications prepared for utility equipment to serve 25 new productive use customers in Development Areas  -Equipment bids let and material procured for new customers in accordance with AID regs.	-Project reports	-Utility needs to purchase equipment
3. Construction	-Financing arrangement reached with 5 utilities to construct 25 new customer hookups each.	-Project reports	-Utility needs to finance customer connect charges to attract customer.
4. Equipment Financing	-Joint arrangement reached with other development agency to co-finance productive use machinery for 75 new electric productive uses	-Contract between NRECA and other agency	-Other agencies exist with interest in productive use promotion in Development Area

Narrative	Verifiable Indicators	Verification Means	Key Assumptions
Project Outputs (cont)			
H. Construction Activities-System  1. Site Selection	-DAM process completed for projects benefiting 3000 new customers in each of 2nd, 3rd, and 4th years of project	-DAM reports	-Data Available -Agencies Cooperate - Complementary investment in other productive infrastructure occurs -Funding for personnel available
2. Engineering	-Review of existing construction standards and preparation of optimized constructions standards for RE in year one.  -Review of local capability for supply of critical components (poles/crossarms) and recommendation on local sourcing  -TA to improve capability of local sources  -Design complete on three distribution system expansion projects (one per yr.) serving total of 10,000 customers, incl. generation if required	-Construction Stds document  -Project report  -Project report and recommendation to accept local source  -Feasibility studies	-Qualified personnel available  -Vendor cooperation -AID would allow foreign sourcing of poles and crossarms if local source inadequate -Adequate funding for TA available -DAM process identifies favorable sites

<p>3. Procurement</p>	<p>-Materials lists and specifications prepared for materials and equipment to serve new customers at rate of 3000/year in years 2-3,4,&amp;5</p> <p>-Proceedure established to routinely handle bidding, awarding, contracting, delivery, and storage of new materials in year 2.</p> <p>-Material procured in orderly fashion for construction projects in years 2,3,4,&amp; 5</p>	<p>-Materials lists</p> <p>-Project reports</p> <p>-Project reports</p>	<p>-Funding for personnel available</p> <p>-AID approves use of NRECA CARES and El Salvador personnel to establish and backstop</p> <p>-Funding available</p>
-----------------------	--	---	---

Narrative	Verifiable Indicators	Verification Means	Key Assumption:
Project Outputs (cont)			
4. Construction	<ul style="list-style-type: none"> <li>-Construction specifications prepared in orderly fashion for projects in years 2,3,4,&amp; 5</li> <li>-Construction completed according to specifications, using on site inspection for quality assurance, for projects in years 2, 3, 4, &amp; 5</li> <li>-Total of 10,000 new customers connected to electric service by EOP</li> </ul>	<ul style="list-style-type: none"> <li>-Specification documents</li> <li>-Progress reports</li> <li>-Project evaluation report</li> </ul>	<ul style="list-style-type: none"> <li>-Funding available</li> <li>-Funding available</li> <li>-Personnel available</li> <li>-Funding available</li> </ul>



Narrative	Verifiable Indicators	Verification Means	Key Assumptions
Project Outputs (cont)			
<p>I. Technical Assistance in System Operations</p> <p>1. Identify and recommend means of eliminating system service problems</p>	<ul style="list-style-type: none"> <li>-Conduct engineering evaluation in 2 utilities/yr of condition of system, current service conditions, maintenance practices, personnel knowledge, training needs, etc., and recommend improvements</li> <li>- Establish training program in target utilities</li> <li>-Finance needed equipment additions-max \$50,000</li> </ul>	<ul style="list-style-type: none"> <li>-System audit report</li> <li>- Report</li> <li>-Contract</li> </ul>	<ul style="list-style-type: none"> <li>-Service quality perceived as impediment to productive use promotion</li> <li>-No other source of financing available</li> </ul>
<p>2. Identify and recommend means of improving utility administration</p>	<ul style="list-style-type: none"> <li>-Conduct in 2 utilities/yr administrative evaluation of accounting, billing, metering and information systems and recommend improvements</li> <li>- Establish training programs in target utilities</li> </ul>	<ul style="list-style-type: none"> <li>-System audit report</li> <li>- Project reports</li> </ul>	<ul style="list-style-type: none"> <li>-Utility requests assistance</li> </ul>

Narrative	Verifiable Indicators	Verification Means	Key Assumptions
Project Outputs (cont)			
<b>J. EFER Formation</b>  1. Define EFER structure and security arrangements	<ul style="list-style-type: none"> <li>-Completed survey of financial institutions to define acceptable security arrangements resulting in lowest delivered cost of financing</li> <li>-Obtain consensus of ANALEC utilities to support viable security requirements</li> <li>-Obtain agreement of MEH and Min Plan to support lending and security arrangements</li> </ul>	<ul style="list-style-type: none"> <li>-Survey report</li> <li>-Project reports</li> <li>-Project reports</li> </ul>	<ul style="list-style-type: none"> <li>-International lending institutions willing to consider EFER structure</li> <li>-RE financing unavailable through other sources at reasonable cost</li> <li>-GOB continues privatization moves</li> </ul>
2. Establish EFER legal structure	-Obtain legal counsel and draft necessary legislation to allow EFER to function with needed security arrangements	-Project reports	-GOB supports EFER concept and continues to support privatization of electric sector
3. Establish EFER business structure	<ul style="list-style-type: none"> <li>-Prepare business plan</li> <li>-Select operating agent</li> </ul>	<ul style="list-style-type: none"> <li>-Plan document</li> <li>-Contract document</li> </ul>	-Outcome of previous steps makes EFER viable business venture
4. Capitalize EFER	<ul style="list-style-type: none"> <li>-Obtain AID seed capital</li> <li>-Secure international loan commitments based on security and seed capital equity</li> <li>-Secure payment of promised contributions by membership</li> </ul>	<ul style="list-style-type: none"> <li>-Project evaluation</li> <li>-Project reports</li> <li>-Project reports</li> </ul>	<ul style="list-style-type: none"> <li>-AID funding available and AID policy continue to support Alt Development sustainability</li> <li>-International lenders continue to support EFER</li> <li>-GOB economic policies continue to encourage foreign investment</li> <li>-Members cooperation</li> </ul>

Narrative	Verifiable Indicators	Verification Means	Key Assumptions
Project Outputs (cont)			
5. Staff EFER	-Establish offices staffed by auditor and engineer in Alt Devel Areas initially, with total national coverage ultimately  -Establish minimum HQ staff to coordinate field and lending agent activities	-Project reports  -Project reports	-Qualified personnel available  -Qualified personnel available
6. Operate EFER	-Using DAM evaluate and arrange funding for feasible and economically attractive projects to connect 10,000 additional users (with emphasis on productive users) to electric service	-Project reports	-Utilities and devel entities cooperate with data  -Utilities accept security arrangements required by EFER

Narrative	Verifiable Indicators	Verification Means	Key Assumptions
Project Inputs			
NRECA Labor  Professional 30 person yrs.  Clerical 17.5 person yrs.  Administrative 4.5 person yrs.  Funding \$15 million USD FX \$5 million USD equiv. in local currency	Project Budgets	Workplans  Project Evaluations	Qualified expat and local specialists available  Timely USAID funding obligations  Timely GOB local currency release. GOB cooperation or policy issues

ANNEX E

ASOCIACION NACIONAL DE EMPRESAS ELECTRICAS  
"ANELEC"

Colón 150 Esq. Av. Mcal. Santa Cruz  
Edificio Litoral 7º. Piso  
Teléfono 326974

Casilla 8224 - Cables: "ANELEC"  
Télex 3369 BV.  
La Paz - Bolivia

La Paz, junio 4 de 1991  
CITE Nº 099/91

Señor  
Jim VanCoevering  
CONSULTOR "NRECA"  
Presente.

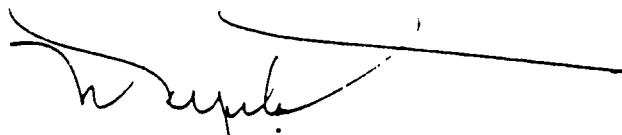
Señor Consultor:

Deseo informar a usted que en la Reunión de Directorio 02/91 de ANELEC, del día martes 28 de mayo del año en curso, se consideró el Proyecto de NRECA para la organización de la Empresa Financiera de Electrificación Rural, EFER.

El Directorio, en la oportunidad resolvió aprobar la conformación de EFER, que se organizaría en forma cooperativa, según las leyes de Bolivia y como institución privada, propiedad de sus miembros. Con el objeto de permitir el funcionamiento de EFER, el Directorio designó una comisión conformada por miembros del Directorio y el Director Ejecutivo de ANELEC, para que en coordinación con técnicos de NRECA se encarguen de preparar el alcance de trabajo, funcionamiento y finalidad de esta institución financiera.

Por lo anotado, tengo el agrado de comunicar a usted mi disposición para iniciar los trabajos que permitan la conformación de EFER, en el momento que ustedes dispongan.

Con este motivo, saludo a usted con mi mayor atención.



Ing. Waldo Tejada Campero  
DIRECTOR EJECUTIVO

c.c. File  
WTC/mds.

## 5C(2) - ASSISTANCE CHECKLIST

Listed below are statutory criteria applicable to the assistance resources themselves, rather than to the eligibility of a country to receive assistance. This section is divided into three parts. Part A includes criteria applicable to both Development Assistance and Economic Support Fund resources. Part B includes criteria applicable only to Development Assistance resources. Part C includes criteria applicable only to Economic Support Funds.

CROSS REFERENCE: IS COUNTRY CHECKLIST UP TO DATE?

### A. CRITERIA APPLICABLE TO BOTH DEVELOPMENT ASSISTANCE AND ECONOMIC SUPPORT FUNDS

**1. Host Country Development Efforts** (FAA Sec. 601(a)): Information and conclusions on whether assistance will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions.

**2. U.S. Private Trade and Investment** (FAA Sec. 601(b)): Information and conclusions on how assistance will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

The goal of the project is to improve the economic and social conditions of the rural population by means of a sustainable rural electric development program that will directly encourage the increased participation of the rural population in the development process.

A private U.S. organization, the National Rural Electric Cooperative Association (NRECA), will provide technical assistance to the project. U.S. firms will also provide computers, supplies, and electric system construction and operation equipment and materials.

### 3. Congressional Notification

a. General requirement (FY 1991 Appropriations Act Secs. 523 and 591; FAA Sec. 634A): If money is to be obligated for an activity not previously justified to Congress, or for an amount in excess of amount previously justified to Congress, has Congress been properly notified (unless the notification requirement has been waived because of substantial risk to human health or welfare)?

A Congressional Notification will be sent to Congress before the obligation of funds.

No funds will be obligated until AID/W advises USAID/Bolivia that the CN has expired without objection.

b. Notice of new account obligation (FY 1991 Appropriations Act Sec. 514): If funds are being obligated under an appropriation account to which they were not appropriated, has the President consulted with and provided a written justification to the House and Senate Appropriations Committees and has such obligation been subject to regular notification procedures?

N/A

c. Cash transfers and nonproject sector assistance (FY 1991 Appropriations Act Sec. 575(b)(3)): If funds are to be made available in the form of cash transfer or nonproject sector assistance, has the Congressional notice included a detailed description of how the funds will be used, with a discussion of U.S. interests to be served and a description of any economic policy reforms to be promoted?

N/A

4. Engineering and Financial Plans (FAA Sec. 611(a)): Prior to an obligation in excess of \$500,000, will there be: (a) engineering, financial or other plans necessary to carry out the assistance; and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

a) Yes .

b) Yes .

5. Legislative Action (FAA Sec. 611(a)(2)): If legislative action is required within recipient country with respect to an obligation in excess of \$500,000, what is the basis for a reasonable expectation that such action

Not required.

will be completed in time to permit orderly accomplishment of the purpose of the assistance?

6. **Water Resources** (FAA Sec. 611(b); FY 1991 Appropriations Act Sec. 501): If project is for water or water-related land resource construction, have benefits and costs been computed to the extent practicable in accordance with the principles, standards, and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See A.I.D. Handbook 3 for guidelines.)

N/A

7. **Cash Transfer and Sector Assistance** (FY 1991 Appropriations Act Sec. 575(b)): Will cash transfer or nonproject sector assistance be maintained in a separate account and not commingled with other funds (unless such requirements are waived by Congressional notice for nonproject sector assistance)?

N/A

8. **Capital Assistance** (FAA Sec. 611(e)): If project is capital assistance (e.g., construction), and total U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability to maintain and utilize the project effectively?

The Mission Director will so certify, prior to obligations in excess of \$1 million and prior to construction.

9. **Multiple Country Objectives** (FAA Sec. 601(a)): Information and conclusions on whether projects will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

The goal of the project is to improve the economic and social conditions of the rural population by means of a sustainable rural electric development program that will directly encourage the increased participation of the rural population in the development process.

108

10. **U.S. Private Trade (FAA Sec. 601(b)):** Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

A private U.S. Organization, the National Rural Electric Cooperative Association (NRECA), will provide technical assistance to the project. U.S. firms will also provide computers, supplies, and electric system construction and operation equipment and materials.

11. **Local Currencies**

a. **Recipient Contributions (FAA Secs. 612(b), 636(h)):** Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.

- a) The Government of Bolivia provides local currency to all AID-GOB projects in conjunction with the Balance of Payment Program. The U.S. does not own Bolivian currency.
- b) No.

b. **U.S.-Owned Currency (FAA Sec. 612(d)):** Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

c. **Separate Account (FY 1991 Appropriations Act Sec. 575).** If assistance is furnished to a foreign government under arrangements which result in the generation of local currencies:

(1) Has A.I.D. (a) required that local currencies be deposited in a separate account established by the recipient government, (b) entered into an agreement with that government providing the amount of local currencies to be generated and the terms and conditions under which the currencies so deposited may be utilized, and (c) established by agreement the responsibilities of A.I.D. and that government to monitor and account for deposits into and disbursements from the separate account?

- 1) Yes, the 1991 ESF agreements and procedures approved by USAID comply with all these requirements.

104.



(2) Will such local currencies, or an equivalent amount of local currencies, be used only to carry out the purposes of the DA or ESF chapters of the FAA (depending on which chapter is the source of the assistance) or for the administrative requirements of the United States Government?

2) Yes.

(3) Has A.I.D. taken all appropriate steps to ensure that the equivalent of local currencies disbursed from the separate account are used for the agreed purposes?

3) Yes.

(4) If assistance is terminated to a country, will any unencumbered balances of funds remaining in a separate account be disposed of for purposes agreed to by the recipient government and the United States Government?

4) N/A

## 12. Trade Restrictions

a. **Surplus Commodities** (FY 1991 Appropriations Act Sec. 521(a)): If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

a) and b)  
Section 559 (a)(3) of the FY91 Appropriations Act provides a waiver of Section 521 restrictions for Bolivia, for the purpose of reducing dependence upon the production of crops from which narcotic and psychotropic drugs are derived.

b. **Textiles (Lautenberg Amendment)** (FY 1991 Appropriations Act Sec. 521(c)): Will the assistance (except for programs in Caribbean Basin Initiative countries under U.S. Tariff Schedule "Section 807," which allows reduced tariffs on articles assembled abroad from U.S.-made components) be used directly to procure feasibility studies, prefeasibility studies, or project profiles of potential investment in, or to assist the establishment of facilities specifically designed for, the manufacture for export to the United States or to third country markets in direct competition with U.S. exports, of

textiles, apparel, footwear, handbags, flat goods (such as wallets or coin purses worn on the person), work gloves or leather wearing apparel?

13. **Tropical Forests** (FY 1991 Appropriations Act Sec. 533(c)(3)): Will funds be used for any program, project or activity which would (a) result in any significant loss of tropical forests, or (b) involve industrial timber extraction in primary tropical forest areas?

a) No.

b) No.

14. **PVO Assistance**

a. **Auditing and registration** (FY 1991 Appropriations Act Sec. 537): If assistance is being made available to a PVO, has that organization provided upon timely request any document, file, or record necessary to the auditing requirements of A.I.D., and is the PVO registered with A.I.D.?

Yes.

b. **Funding sources** (FY 1991 Appropriations Act, Title II, under heading "Private and Voluntary Organizations"): If assistance is to be made to a United States PVO (other than a cooperative development organization), does it obtain at least 20 percent of its total annual funding for international activities from sources other than the United States Government?

Yes:

15. **Project Agreement Documentation** (State Authorization Sec. 139 (as interpreted by conference report)): Has confirmation of the date of signing of the project agreement, including the amount involved, been cabled to State L/T and A.I.D. LEG within 60 days of the agreement's entry into force with respect to the United States, and has the full text of the agreement been pouched to those same offices? (See Handbook 3, Appendix 6G for agreements covered by this provision).

N/A, because the agreement is for less than \$25 million.

111-

16. **Metric System** (Omnibus Trade and Competitiveness Act of 1988 Sec. 5164, as interpreted by conference report, amending Metric Conversion Act of 1975 Sec. 2, and as implemented through A.I.D. policy):

Does the assistance activity use the metric system of measurement in its procurements, grants, and other business-related activities, except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms?

Yes.

Are bulk purchases usually to be made in metric, and are components, subassemblies, and semi-fabricated materials to be specified in metric units when economically available and technically

Yes.

adequate? Will A.I.D. specifications use metric units of measure from the earliest programmatic stages, and from the earliest documentation of the assistance processes (for example, project papers) involving quantifiable measurements (length, area, volume, capacity, mass and weight), through the implementation stage?

Yes.

17. **Women in Development** (FY 1991 Appropriations Act, Title II, under heading "Women in Development"): Will assistance be designed so that the percentage of women participants will be demonstrably increased?

Yes.

18. **Regional and Multilateral Assistance** (FAA Sec. 209): Is assistance more efficiently and effectively provided through regional or multilateral organizations? If so, why is assistance not so provided? Information and conclusions on whether assistance will encourage developing countries to cooperate in regional development programs.

No. However, USAID/Bolivia is coordinating all project activities with all international donors in Bolivia.

**19. Abortions (FY 1991 Appropriations Act, Title II, under heading "Population, DA," and Sec. 525):**

a. Will assistance be made available to any organization or program which, as determined by the President, supports or participates in the management of a program of coercive abortion or involuntary sterilization? No.

b. Will any funds be used to lobby for abortion? No.

**20. Cooperatives (FAA Sec. 111):** Will assistance help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward a better life? Yes.

**21. U.S.-Owned Foreign Currencies**

a. **Use of currencies (FAA Secs. 612(b), 636(h); FY 1991 Appropriations Act Secs. 507, 509):** Describe steps taken to assure that, to the maximum extent possible, foreign currencies owned by the U.S. are utilized in lieu of dollars to meet the cost of contractual and other services. The U.S. does not own any significant amount of Bolivian currency.

b. **Release of currencies (FAA Sec. 612(d)):** Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release? No.

**22. Procurement**

a. **Small business (FAA Sec. 602(a)):** Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed? Yes.

b. **U.S. procurement (FAA Sec. 604(a)):** Will all procurement be from the U.S. except as otherwise determined by the President or determined under delegation from him? Yes, except for items purchased locally of Bolivian origin.

c. **Marine insurance** (FAA Sec. 604(d)): If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company?

N/A

d. **Non-U.S. agricultural procurement** (FAA Sec. 604(e)): If non-U.S. procurement of agricultural commodity or product thereof is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.)

No procurements of agricultural commodities are planned.

e. **Construction or engineering services** (FAA Sec. 604(g)): Will construction or engineering services be procured from firms of advanced developing countries which are otherwise eligible under Code 941 and which have attained a competitive capability in international markets in one of these areas? (Exception for those countries which receive direct economic assistance under the FAA and permit United States firms to compete for construction or engineering services financed from assistance programs of these countries.)

No.

f. **Cargo preference shipping** (FAA Sec. 603): Is the shipping excluded from compliance with the requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates?

No.

g. **Technical assistance** (FAA Sec. 621(a)): If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? Will the

Yes.

facilities and resources of other Federal agencies be utilized, when they are particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs? Yes.

**h. U.S. air carriers**  
(International Air Transportation Fair Competitive Practices Act, 1974): If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available? Yes.

**i. Termination for convenience of U.S. Government** (FY 1991 Appropriations Act Sec. 504): If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States? Yes.

**j. Consulting services**  
(FY 1991 Appropriations Act Sec. 524): If assistance is for consulting service through procurement contract pursuant to 5 U.S.C. 3109, are contract expenditures a matter of public record and available for public inspection (unless otherwise provided by law or Executive order)? Yes.

**k. Metric conversion**  
(Omnibus Trade and Competitiveness Act of 1988, as interpreted by conference report, amending Metric Conversion Act of 1975 Sec. 2, and as implemented through A.I.D. policy): Does the assistance program use the metric system of measurement in its procurements, grants, and other business-related activities, except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms? Are bulk purchases usually to be made in metric, and are components, subassemblies, and semi-fabricated materials to be specified in metric units when economically available and technically adequate? Will A.I.D. specifications use metric units of measure from the earliest programmatic stages, and from the earliest Yes.  
Yes.

documentation of the assistance processes (for example, project papers) involving quantifiable measurements (length, area, volume, capacity, mass and weight), through the implementation stage? Yes.

1. **Competitive Selection Procedures** (FAA Sec. 601(e)): Will the assistance utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes.

23. **Construction**

a. **Capital project** (FAA Sec. 601(d)): If capital (e.g., construction) project, will U.S. engineering and professional services be used? Yes.

b. **Construction contract** (FAA Sec. 611(c)): If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable? Yes.

c. **Large projects, Congressional approval** (FAA Sec. 620(k)): If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million (except for productive enterprises in Egypt that were described in the Congressional Presentation), or does assistance have the express approval of Congress? N/A

24. **U.S. Audit Rights** (FAA Sec. 301(d)): If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? N/A

25. **Communist Assistance** (FAA Sec. 620(h)). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries? Yes.

**26. Narcotics**

**a. Cash reimbursements (FAA Sec. 483):** Will arrangements preclude use of financing to make reimbursements, in the form of cash payments, to persons whose illicit drug crops are eradicated? Yes.

**b. Assistance to narcotics traffickers (FAA Sec. 487):** Will arrangements take "all reasonable steps" to preclude use of financing to or through individuals or entities which we know or have reason to believe have either: (1) been convicted of a violation of any law or regulation of the United States or a foreign country relating to narcotics (or other controlled substances); or (2) been an illicit trafficker in, or otherwise involved in the illicit trafficking of, any such controlled substance? Yes, USAID/Bolivia has developed a certification form for contractors, grantees, and borrowers under Section 487, by which USAID and the U.S. Embassy can check the appropriate narcotics records to ensure compliance.

**27. Expropriation and Land Reform (FAA Sec. 620(q)):** Will assistance preclude use of financing to compensate owners for expropriated or nationalized property, except to compensate foreign nationals in accordance with a land reform program certified by the President? Yes.

**28. Police and Prisons (FAA Sec. 660):** Will assistance preclude use of financing to provide training, advice, or any financial support for police, prisons, or other law enforcement forces, except for narcotics programs? Yes.

**29. CIA Activities (FAA Sec. 662):** Will assistance preclude use of financing for CIA activities? Yes.

**30. Motor Vehicles (FAA Sec. 636(i)):** Will assistance preclude use of financing for purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained? Yes.



31. **Military Personnel** (FY 1991 Appropriations Act Sec. 503): Will assistance preclude use of financing to pay pensions, annuities, retirement pay, or adjusted service compensation for prior or current military personnel? Yes.

32. **Payment of U.N. Assessments** (FY 1991 Appropriations Act Sec. 505): Will assistance preclude use of financing to pay U.N. assessments, arrearages or dues? Yes.

33. **Multilateral Organization Lending** (FY 1991 Appropriations Act Sec. 506): Will assistance preclude use of financing to carry out provisions of FAA section 209(d) (transfer of FAA funds to multilateral organizations for lending)? Yes.

34. **Export of Nuclear Resources** (FY 1991 Appropriations Act Sec. 510): Will assistance preclude use of financing to finance the export of nuclear equipment, fuel, or technology? Yes.

35. **Repression of Population** (FY 1991 Appropriations Act Sec. 511): Will assistance preclude use of financing for the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights? Yes.

36. **Publicity or Propoganda** (FY 1991 Appropriations Act Sec. 516): Will assistance be used for publicity or propoganda purposes designed to support or defeat legislation pending before Congress, to influence in any way the outcome of a political election in the United States, or for any publicity or propoganda purposes not authorized by Congress? No.

37. **Marine Insurance** (FY 1991 Appropriations Act Sec. 563): Will any A.I.D. contract and solicitation, and subcontract entered into under such contract, include a clause requiring that U.S. marine insurance companies have a fair opportunity to bid for marine insurance when such insurance is necessary or appropriate?

Yes.

38. **Exchange for Prohibited Act** (FY 1991 Appropriations Act Sec. 569): Will any assistance be provided to any foreign government (including any instrumentality or agency thereof), foreign person, or United States person in exchange for that foreign government or person undertaking any action which is, if carried out by the United States Government, a United States official or employee, expressly prohibited by a provision of United States law?

No.

B. CRITERIA APPLICABLE TO DEVELOPMENT ASSISTANCE ONLY

1. **Agricultural Exports (Bumpers Amendment)** (FY 1991 Appropriations Act Sec. 521(b), as interpreted by conference report for original enactment): If assistance is for agricultural development activities (specifically, any testing or breeding feasibility study, variety improvement or introduction, consultancy, publication, conference, or training), are such activities: (1) specifically and principally designed to increase agricultural exports by the host country to a country other than the United States, where the export would lead to direct competition in that third country with exports of a similar commodity grown or produced in the United States, and can the activities reasonably be expected to cause substantial injury to U.S. exporters of a similar agricultural commodity; or (2) in support of research that is intended primarily to benefit U.S. producers?

Section 559 (a)(3) of the FY91 Appropriations Act waives Section 521 for Bolivia.

2. **Tied Aid Credits (FY 1991 Appropriations Act, Title II, under heading "Economic Support Fund"):** Will DA funds be used for tied aid credits?

No.

3. **Appropriate Technology (FAA Sec. 107):** Is special emphasis placed on use of appropriate technology (defined as relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?

Yes.

4. **Indigenous Needs and Resources (FAA Sec. 281(b)):** Describe extent to which the activity recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The project will meet Bolivia's need to reduce illicit coca production and to expand agricultural and industrial productivity.

5. **Economic Development (FAA Sec. 101(a)):** Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

Yes.

6. **Special Development Emphases (FAA Secs. 102(b), 113, 281(a)):** Describe extent to which activity will: (a) effectively involve the poor in development by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, dispersing investment from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using appropriate U.S. institutions; (b) encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries

- a) The poor will benefit from expanded agricultural and industrial productivity in rural areas.
- b) The project will work with rural electric cooperatives.
- c) The project will work with the Ministry of Energy and Hydrocarbons and productive end use groups.
- d) Project will have a direct impact in improving the economic and social conditions of women, and will increase participation of women in the development process.

and the improvement of women's status; and  
(e) utilize and encourage regional  
cooperation by developing countries.

e) The success/failure of  
the project will be shared  
with other Andean activities.

7. **Recipient Country Contribution**  
(FAA Secs. 110, 124(d)): Will the  
recipient country provide at least 25  
percent of the costs of the program,  
project, or activity with respect to which  
the assistance is to be furnished (or is  
the latter cost-sharing requirement being  
waived for a "relatively least developed"  
country)?

Yes, 25%.

8. **Benefit to Poor Majority** (FAA  
Sec. 128(b)): If the activity attempts to  
increase the institutional capabilities of  
private organizations or the government of  
the country, or if it attempts to  
stimulate scientific and technological  
research, has it been designed and will it  
be monitored to ensure that the ultimate  
beneficiaries are the poor majority?

Yes.

9. **Abortions** (FAA Sec. 104(f); FY  
1991 Appropriations Act, Title II, under  
heading "Population, DA," and Sec. 535):

a. Are any of the funds to be  
used for the performance of abortions as a  
method of family planning or to motivate  
or coerce any person to practice  
abortions?

No.

b. Are any of the funds to be  
used to pay for the performance of  
involuntary sterilization as a method of  
family planning or to coerce or provide  
any financial incentive to any person to  
undergo sterilizations?

No.

c. Are any of the funds to be  
made available to any organization or  
program which, as determined by the  
President, supports or participates in the  
management of a program of coercive  
abortion or involuntary sterilization?

No.

d. Will funds be made available only to voluntary family planning projects which offer, either directly or through referral to, or information about access to, a broad range of family planning methods and services? N/A, not a family planning project.

e. In awarding grants for natural family planning, will any applicant be discriminated against because of such applicant's religious or conscientious commitment to offer only natural family planning? N/A

f. Are any of the funds to be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning? No.

g. Are any of the funds to be made available to any organization if the President certifies that the use of these funds by such organization would violate any of the above provisions related to abortions and involuntary sterilization? No.

10. Contract Awards (FAA Sec. 601(e)): Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes.

11. Disadvantaged Enterprises (FY 1991 Appropriations Act Sec. 567): What portion of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, colleges and universities having a student body in which more than 40 percent of the students are Hispanic Americans, and private and voluntary organizations which are controlled by individuals who are black Americans, Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)? These organizations may bid for subcontracts under the project.

12. **Biological Diversity (FAA Sec. 119(g):** Will the assistance: (a) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity; (b) be provided under a long-term agreement in which the recipient country agrees to protect ecosystems or other wildlife habitats; (c) support efforts to identify and survey ecosystems in recipient countries worthy of protection; or (d) by any direct or indirect means significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas?

- a) Yes.
- b) No.
- c) Yes.
- d) No.

13. **Tropical Forests (FAA Sec. 118; FY 1991 Appropriations Act Sec. 533(c)-(e) & (g)):**

a. **A.I.D. Regulation 16:** Does the assistance comply with the environmental procedures set forth in A.I.D. Regulation 16?

Yes.

b. **Conservation:** Does the assistance place a high priority on conservation and sustainable management of tropical forests? Specifically, does the assistance, to the fullest extent feasible: (1) stress the importance of conserving and sustainably managing forest resources; (2) support activities which offer employment and income alternatives to those who otherwise would cause destruction and loss of forests, and help countries identify and implement alternatives to colonizing forested areas; (3) support training programs, educational efforts, and the establishment or strengthening of institutions to improve forest management; (4) help end destructive slash-and-burn agriculture by supporting stable and productive farming practices; (5) help conserve forests which have not yet been degraded by helping to increase production on lands already cleared or degraded; (6) conserve forested watersheds and rehabilitate those which have been deforested; (7) support training, research, and other actions

An environmental assessment will be conducted prior to construction of electrical transmission facilities, so as to minimize their effect on the environment. Electricity supplied by the project will help create jobs and income for persons who otherwise might contribute to the destruction of tropical forests.

which lead to sustainable and more environmentally sound practices for timber harvesting, removal, and processing; (8) support research to expand knowledge of tropical forests and identify alternatives which will prevent forest destruction, loss, or degradation; (9) conserve biological diversity in forest areas by supporting efforts to identify, establish, and maintain a representative network of protected tropical forest ecosystems on a worldwide basis, by making the establishment of protected areas a condition of support for activities involving forest clearance or degradation, and by helping to identify tropical forest ecosystems and species in need of protection and establish and maintain appropriate protected areas; (10) seek to increase the awareness of U.S. Government agencies and other donors of the immediate and long-term value of tropical forests; (11) utilize the resources and abilities of all relevant U.S. government agencies; (12) be based upon careful analysis of the alternatives available to achieve the best sustainable use of the land; and (13) take full account of the environmental impacts of the proposed activities on biological diversity?

All N/A

c. **Forest degradation:** Will assistance be used for: (1) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner and that the proposed activity will produce positive economic benefits and sustainable forest management systems; (2) actions which will significantly degrade national parks or similar protected areas which contain tropical forests, or introduce exotic plants or animals into such areas; (3) activities which would result in the conversion of forest lands to the rearing of livestock; (4) the construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undergraded

All No.

forest lands; (5) the colonization of forest lands; or (6) the construction of dams or other water control structures which flood relatively undergraded forest lands, unless with respect to each such activity an environmental assessment indicates that the activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development?

All no.

d. **Sustainable forestry:** If assistance relates to tropical forests, will project assist countries in developing a systematic analysis of the appropriate use of their total tropical forest resources, with the goal of developing a national program for sustainable forestry?

N/A

e. **Environmental impact statements:** Will funds be made available in accordance with provisions of FAA Section 117(c) and applicable A.I.D. regulations requiring an environmental impact statement for activities significantly affecting the environment?

Yes.

14. **Energy (FY 1991 Appropriations Act Sec. 533(c)):** If assistance relates to energy, will such assistance focus on: (a) end-use energy efficiency, least-cost energy planning, and renewable energy resources, and (b) the key countries where assistance would have the greatest impact on reducing emissions from greenhouse gases?

a) Yes.

b) No.

15. **Sub-Saharan Africa Assistance (FY 1991 Appropriations Act Sec. 562, adding a new FAA chapter 10 (FAA Sec. 496)):** If assistance will come from the Sub-Saharan Africa DA account, is it: (a) to be used to help the poor majority in Sub-Saharan Africa through a process of long-term development and economic growth that is equitable, participatory, environmentally sustainable, and self-reliant; (b) to be used to promote sustained economic growth, encourage

N/A



private sector development, promote individual initiatives, and help to reduce the role of central governments in areas more appropriate for the private sector; (c) to be provided in a manner that takes into account, during the planning process, the local-level perspectives of the rural and urban poor, including women, through close consultation with African, United States and other PVOs that have demonstrated effectiveness in the promotion of local grassroots activities on behalf of long-term development in Sub-Saharan Africa; (d) to be implemented in a manner that requires local people, including women, to be closely consulted and involved, if the assistance has a local focus; (e) being used primarily to promote reform of critical sectoral economic policies, or to support the critical sector priorities of agricultural production and natural resources, health, voluntary family planning services, education, and income generating opportunities; and (f) to be provided in a manner that, if policy reforms are to be effected, contains provisions to protect vulnerable groups and the environment from possible negative consequences of the reforms?

N/A

16. **Debt-for-Nature Exchange** (FAA Sec. 463): If project will finance a debt-for-nature exchange, describe how the exchange will support protection of: (a) the world's oceans and atmosphere, (b) animal and plant species, and (c) parks and reserves; or describe how the exchange will promote: (d) natural resource management, (e) local conservation programs, (f) conservation training programs, (g) public commitment to conservation, (h) land and ecosystem management, and (i) regenerative approaches in farming, forestry, fishing, and watershed management.

N/A

**17. Deobligation/Reobligation**  
(FY 1991 Appropriations Act Sec. 515): If deob/reob authority is sought to be exercised in the provision of DA assistance, are the funds being obligated for the same general purpose, and for countries within the same region as originally obligated, and have the House and Senate Appropriations Committees been properly notified? N/A

**18. Loans**

**a. Repayment capacity** (FAA Sec. 122(b)): Information and conclusion on capacity of the country to repay the loan at a reasonable rate of interest. N/A

**b. Long-range plans** (FAA Sec. 122(b)): Does the activity give reasonable promise of assisting long-range plans and programs designed to develop economic resources and increase productive capacities? N/A

**c. Interest rate** (FAA Sec. 122(b)): If development loan is repayable in dollars, is interest rate at least 2 percent per annum during a grace period which is not to exceed ten years, and at least 3 percent per annum thereafter? N/A

**d. Exports to United States** (FAA Sec. 620(d)): If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20 percent of the enterprise's annual production during the life of the loan, or has the requirement to enter into such an agreement been waived by the President because of a national security interest? N/A

**19. Development Objectives** (FAA Secs. 102(a), 111, 113, 281(a)): Extent to which activity will: (1) effectively involve the poor in development, by expanding access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from

1) The poor will benefit from expanded agricultural and industrial productivity in rural areas.

cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (2) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (3) support the self-help efforts of developing countries; (4) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (5) utilize and encourage regional cooperation by developing countries?

**20. Agriculture, Rural Development and Nutrition, and Agricultural Research (FAA Secs. 103 and 103A):**

**a. Rural poor and small farmers:** If assistance is being made available for agriculture, rural development or nutrition, describe extent to which activity is specifically designed to increase productivity and income of rural poor; or if assistance is being made available for agricultural research, has account been taken of the needs of small farmers, and extensive use of field testing to adapt basic research to local conditions shall be made.

**b. Nutrition:** Describe extent to which assistance is used in coordination with efforts carried out under FAA Section 104 (Population and Health) to help improve nutrition of the people of developing countries through encouragement of increased production of crops with greater nutritional value; improvement of planning, research, and education with respect to nutrition, particularly with reference to improvement and expanded use of indigenously produced foodstuffs; and the undertaking of pilot or demonstration programs explicitly addressing the problem of malnutrition of poor and vulnerable people.

- 2) The project will work with rural electric cooperatives.
- 3) The project will work with the Ministry of Energy and Hydrocarbons and productive end use groups.
- 4) The project will have a direct impact in improving the economic and social conditions of women, and will increase participation of women in the development process.
- 5) The success/failure of the project will be shared with other Andean activities.

The project will expand the use of electricity in rural areas for high value agriculture, agro-processing and other industry, and in traditional economic activities in order to provide jobs and alleviate poverty.

The project will promote increased production/use of Crops/Food stuffs through productive end use training and development.

**c. Food security:** Describe extent to which activity increases national food security by improving food policies and management and by strengthening national food reserves, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.

N/A

**21. Population and Health (FAA Secs. 104(b) and (c)):** If assistance is being made available for population or health activities, describe extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems, and other modes of community outreach.

N/A

**22. Education and Human Resources Development (FAA Sec. 105):** If assistance is being made available for education, public administration, or human resource development, describe (a) extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, and strengthens management capability of institutions enabling the poor to participate in development; and (b) extent to which assistance provides advanced education and training of people of developing countries in such disciplines as are required for planning and implementation of public and private development activities.

- a) The project will promote technical, managerial and commercial training for rural electric cooperatives.
- b) The project will educate and train rural populations to increase productive end uses of electricity.

**23. Energy, Private Voluntary Organizations, and Selected Development Activities (FAA Sec. 106):** If assistance is being made available for energy, private voluntary organizations, and selected development problems, describe extent to which activity is:

124

a. concerned with data collection and analysis, the training of skilled personnel, research on and development of suitable energy sources, and pilot projects to test new methods of energy production; and facilitative of research on and development and use of small-scale, decentralized, renewable energy sources for rural areas, emphasizing development of energy resources which are environmentally acceptable and require minimum capital investment;

The project will support data collection and analysis for productive uses of electricity and development of suitable energy production pilot projects which are environmentally acceptable and require minimum capitalization.

b. concerned with technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;

The project will utilize U.S. based NGO (NRECA), and will encourage development participation by the World Bank, IDB, etc.

c. research into, and evaluation of, economic development processes and techniques;

N/A

d. reconstruction after natural or manmade disaster and programs of disaster preparedness;

N/A

e. for special development problems, and to enable proper utilization of infrastructure and related projects funded with earlier U.S. assistance;

The project relies heavily on existing U.S. funded marketing and economic development projects.

f. for urban development, especially small, labor-intensive enterprises, marketing systems for small producers, and financial or other institutions to help urban poor participate in economic and social development.

N/A

C. CRITERIA APPLICABLE TO ECONOMIC SUPPORT FUNDS ONLY

1. **Economic and Political Stability** (FAA Sec. 531(a)): Will this assistance promote economic and political stability? To the maximum extent feasible, is this assistance consistent with the policy directions, purposes, and programs of Part I of the FAA?

Yes.

Yes.

2. **Military Purposes** (FAA Sec. 531(e)): Will this assistance be used for military or paramilitary purposes?

No.

3. **Commodity Grants/Separate Accounts** (FAA Sec. 609): If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? (For FY 1991, this provision is superseded by the separate account requirements of FY 1991 Appropriations Act Sec. 575(a), see Sec. 575(a)(5).)

N/A

4. **Generation and Use of Local Currencies** (FAA Sec. 531(d)): Will ESF funds made available for commodity import programs or other program assistance be used to generate local currencies? If so, will at least 50 percent of such local currencies be available to support activities consistent with the objectives of FAA sections 103 through 106? (For FY 1991, this provision is superseded by the separate account requirements of FY 1991 Appropriations Act Sec. 575(a), see Sec. 575(a)(5).)

Yes.

Yes.

5. **Cash Transfer Requirements** (FY 1991 Appropriations Act, Title II, under heading "Economic Support Fund," and Sec. 575(b)). If assistance is in the form of a cash transfer:

Funds obligated in this project will not be cash transfer assistance.

a. **Separate account:** Are all such cash payments to be maintained by the country in a separate account and not to be commingled with any other funds?

N/A

131

b. **Local currencies:** Will all local currencies that may be generated with funds provided as a cash transfer to such a country also be deposited in a special account, and has A.I.D. entered into an agreement with that government setting forth the amount of the local currencies to be generated, the terms and conditions under which they are to be used, and the responsibilities of A.I.D. and that government to monitor and account for deposits and disbursements?

N/A

c. **U.S. Government use of local currencies:** Will all such local currencies also be used in accordance with FAA Section 609, which requires such local currencies to be made available to the U.S. government as the U.S. determines necessary for the requirements of the U.S. Government, and which requires the remainder to be used for programs agreed to by the U.S. Government to carry out the purposes for which new funds authorized by the FAA would themselves be available?

N/A

d. **Congressional notice:** Has Congress received prior notification providing in detail how the funds will be used, including the U.S. interests that will be served by the assistance, and, as appropriate, the economic policy reforms that will be promoted by the cash transfer assistance?

N/A

132