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ECUADOR

**LOAN TO THE INSTITUTO ECUATORIANO DE ELECTRIFICACIÓN
FOR A RURAL ELECTRIFICATION PROJECT**

(EC0104; 669/SF-EC)

LOAN PROPOSAL

1981

E C U A D O R

RURAL ELECTRIFICATION PROJECT

EC-0104

LOAN PROPOSAL

C O N T E N T S

Basic Socioeconomic Data

Loan Proposal

- Appendices I - Proposed Resolution
II - Recommendations
III - Description of the Project
(Annex A of the Loan Contract)

Datos Socioeconómicos Básicos del Ecuador

1. Datos Generales

Población total (miles de habitantes) 1979	8.078,0
Población rural %	56,5
Extensión territorial (km2)	270.670,0
Habitantes por Km2	29,8
Tasa de crecimiento demográfico (1974-79)	3,0
Producto interno bruto por hab. US\$ 1979	1.135,0
Tasa de natalidad por mil habitantes (1977)	43,2
Tasa de mortalidad por mil habitantes (1977)	7,8
Tasa de mortalidad infantil 0/00 (1977)	70,9
Médicos por 10.000 habitantes (1977)	6,2
Número de camas de hospital por cada mil habitantes (1977)	1,9
Alfabetismo (1979) %	78,0
Tasa de inscripción primaria (1976) %	
Tasa de inscripción secundaria (1976) %	56,6
Tasa de cambio (1980)	US\$1 = 25 sucres
Consumo de energía per cápita (año) kwh. 1978:	245,0

Población Económicamente Activa por Sectores (1979):

	<u>En miles</u>	<u>%</u>
Agricultura y pesca	1.296,1	49,0
Minería	8,4	0,3
Manufactura	277,7	10,5
Construcción	119,3	4,5
Comercio, restaurantes y hoteles	263,8	10,0
Otros	677,5	25,6
Total	2.642,5	100,0

Tasa de desempleo (Promedio censo 1974)

Producto	Composición (%)						Tasa Real de Crecimiento Anual (%) a/						
	1975	1976	1977	1978	1979 b/	1980 b/	1972-74	1975	1976	1977	1978	1979	1980
Producto de Mercado	100,0	100,0	100,0	100,0	100,0	100,0	11,3	5,6	9,2	6,2	5,5	5,8	4,1
Interna Bruta	26,7	23,2	27,0	26,8	27,0	25,9	11,6	17,2	-5,2	23,5	4,7	6,6	0,1
Exportaciones	79,7	79,8	81,5	81,2	81,7	85,8	10,1	11,8	9,3	8,5	5,0	6,5	9,0
Importaciones	26,2	26,0	23,0	22,7	20,5	17,3	21,4	-8,4	8,5	-6,3	4,3	-4,5	-11,0
Bienes	-32,7	-29,0	-31,5	-30,6	-29,2	-29,1	-15,2	16,7	-3,0	15,2	2,6	0,7	4,0
Servicios													
Financieros													
Otros													
Producto no de Mercado													
Transferencias	17,9	16,9	16,0	14,9	14,4	14,1	5,3	2,3	2,9	0,4	-1,5	2,0	2,0
Transferencias	14,6	15,8	14,5	15,3	15,3	13,9	104,1	-16,5	18,4	-3,0	11,7	5,5	-5,0
Transferencias	12,9	13,6	13,9	13,3	13,7	14,0	9,8	19,5	14,4	9,1	0,8	8,9	6,0
Transferencias	0,8	0,8	0,9	0,9	1,0	1,3	13,4	16,7	13,1	21,5	8,0	16,5	32,0
Transferencias	5,6	5,5	5,5	5,3	5,3	5,4	8,1	7,2	7,1	7,7	1,7	4,8	6,0
Transferencias	15,7	15,2	16,0	16,6	16,7	16,8	6,0	13,3	5,8	11,7	9,0	6,8	5,0
Transferencias	5,7	5,9	6,2	6,4	6,5	6,7	8,6	15,8	12,6	11,7	8,0	7,7	7,0
Transferencias	10,4	10,3	10,9	11,3	11,6	12,4	18,5	5,9	7,8	12,8	9,5	8,3	11,0
Transferencias	7,5	7,8	7,4	7,4	7,1	7,0	8,3	16,5	13,6	0,8	5,5	1,5	3,0
Transferencias	8,9	8,2	8,7	8,6	8,4	8,4	12,3	15,9	13,2	0,0	4,2	2,9	4,0
Transferencias	100,0	100,0	100,0	100,0	100,0	100,0							

a/ de 1975.

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Central del Ecuador.

Producto	(En millones de US\$)						Tasa de Crecimiento Anual (%)						
	1975	1976	1977	1978	1979	1980	1972-74	1975	1976	1977	1978	1979	1980
Producto de Bienes (FOB)	897,2	1.127,3	1.191,6	1.493,8	2.172,7	2.393,6	78,0	-13,3	25,6	5,7	25,4	45,4	10,0
Primarios	812,7	1.006,3	898,0	1.092,4	1.634,6	1.791,3	82,4	-15,4	23,8	-10,8	21,6	49,6	9,0
Industrializados	84,5	121,0	293,6	401,4	538,1	602,3	46,8	10,4	43,2	142,6	36,7	34,1	11,0
Principales													
Cacao	142,4	136,7	138,3	171,8	200,1	237,0	12,8	9,5	-4,0	1,2	24,2	16,5	18,0
Cacao	42,3	32,5	58,7	50,4	42,3	30,4	61,6	-58,9	-2,3	80,6	-14,1	-16,1	-28,0
Cacao	28,4	62,4	185,7	207,4	234,0	180,7	74,2	26,3	119,7	197,6	11,7	12,8	-22,0
Cacao	64,3	205,4	156,6	281,2	263,1	130,0	23,4	-3,4	219,4	-23,8	79,6	-6,4	-50,0
Cacao	24,5	33,9	35,4	42,3	63,1	65,9	24,6	33,3	38,4	4,4	19,5	49,2	4,0
Cacao	516,0	565,2	484,1	523,3	1.032,0	1.294,2	732,7	-15,3	9,5	-14,3	8,1	97,2	25,0
Cacao	0,9	---	18,0	91,4	145,4	179,8	---	---	---	---	407,8	59,1	23,0
Otros	12,3	20,0	37,5	47,2	59,5	89,8	31,1	-14,9	62,6	87,5	25,9	26,1	50,0
Producto de Bienes													
Consumo no	987,0	958,3	1.508,4	1.630,2	1.985,6	2.249,5	25,9	45,5	-2,9	57,4	8,1	21,8	13,0
Consumo no	69,2	64,6	85,2	85,8	87,0	---	26,7	38,4	-6,6	31,9	0,7	1,3	---
Consumo Duradero	60,5	43,0	82,6	92,7	93,5	---	56,1	17,0	-28,9	92,0	12,2	0,9	---
Consumo Duradero	19,1	9,1	9,4	11,1	13,5	---	2,6	-36,1	-52,4	3,3	18,1	21,6	---
Intermedios	412,8	409,7	602,8	609,7	836,3	---	25,1	32,9	-0,8	47,1	1,1	37,2	---
Capital	425,4	431,8	728,4	830,9	955,3	---	26,9	80,2	1,5	68,7	14,1	15,0	---

En los permisos concedidos, por lo tanto difiere de los datos de la balanza de pagos del punto siguiente.

Central del Ecuador, CONADE.

Cuentas	En Millones de US\$						Tasa de Crecimiento Anual					
	1975	1976	1977	1978	1979 a/	1980 a/	1975	1976	1977	1978	1979 a/	1980 a/
(FOB)	1.013	1.307	1.401	1.537	2.171	2.530	17,4	29,0	7,2	9,7	41,2	16,5
(FOB)	1.006	1.048	1.361	1.559	2.097	2.204	15,0	4,2	29,9	14,5	34,5	5,1
	-259	-297	-418	-612	-721	-942	-24,7	14,7	40,7	46,4	17,8	30,7
	32	31	36	44	30	40	3,2	--	16,1	22,2	-25,0	33,3
ta Corriente	-220	-7	-342	-590	-617	-576	-578,9	-96,8	4.785,7	72,5	4,6	-6,6
e Capital (Neto)	155	210	454	627	619	909						
to	200	157	591	756	819	917						
	63	170	492	528	353	--						
	137	-13	99	228	466	--						
zo	-45	53	-137	-129	-200	-8						
siones	--	--	--	--	18	-53						
Nivel de Reservas												
	65	-203	-112	-37	-20	-280						
ernacionales Netas B.C.	246	434	570	601	631	857						

Categorías	En Porcentaje del PIB														
	Sector Público								Plan Nacional de Desarrollo						
	1971	1974	1975	1976	1977	1978	1979	a/	1980	a/	1980	1981	1982	1983	1984
Inversión	19,1	21,5	19,2	19,1	17,6	20,6	20,7		23,9		25,6	25,8	25,6	25,1	25,7
Consumo	(19,1)	(14,2)	(13,6)	(13,9)	(13,7)	(14,1)	(14,0)		(12,8)		(15,5)	(16,1)	(16,7)	(16,6)	(17,1)
Exportaciones	(—)	(7,3)	(5,6)	(5,2)	(3,9)	(6,5)	(6,7)		(11,1)		(10,1)	(9,7)	(8,9)	(8,5)	(8,6)
Importaciones	14,1	13,7	11,4	11,3	11,5	15,4	17,5		21,0		18,3	18,2	17,9	17,5	17,9
Cuenta Corriente	5,0	7,8	7,9	7,8	6,1	5,2	3,2		2,9		7,3	7,6	7,7	7,6	7,8
Capital	0,3	1,3	2,9	2,4	1,0	1,0	0,4		0,2		0,6	0,4	0,5	0,4	0,4
Total	6,1	9,7	11,7	12,5	10,9	9,9	9,2		10,3		11,7	12,1	11,9	11,6	11,3
Financiera	(5,6)	(7,9)	(9,8)	(10,5)	(10,2)	(8,5)	(8,9)		(10,1)		(10,0)	(10,2)	(10,6)	(10,7)	(10,8)
Saldo	(0,5)	(1,8)	(1,9)	(2,0)	(0,7)	(1,4)	(0,3)		(0,2)		(0,8)	(0,7)	(0,6)	(0,6)	(0,5)
Superávit (+)	(--)	(--)	(--)	(--)	(--)	(--)	(--)		(--)		(0,9)	(1,2)	(0,7)	(0,3)	(--)
Deficit (-)	-0,8	-0,6	-0,9	-2,3	-3,8	-3,7	-5,6		-7,2		-3,8	-4,1	-3,8	-3,6	-3,1
Saldo del Superávit	0,8	0,6	0,9	2,3	3,8	3,7	5,6		7,2		3,8	4,1	3,8	3,6	3,1
Gobierno Neto	(0,7)	(0,7)	(0,7)	(0,9)	(1,6)	(5,3)	(5,0)		(1,5)		(0,8)	(0,5)	(0,5)	(0,3)	(--)
Externo Neto	(-0,2)	(0,3)	(-0,1)	(1,4)	(2,4)	(-1,0)	(--)		(5,2)		(2,5)	(3,5)	(3,3)	(3,3)	(3,1)
Externo Bruto	(0,3)	(-0,4)	(0,3)	(--)	(-0,2)	(-0,6)	(0,6)		(0,5)		(0,5)	(0,1)	(--)	(--)	(--)

banco Nacional

	(Millones de Sucres al 31 de Diciembre)							Tasa de Crecimiento Anual						
	1971	1975	1976	1977	1978	1979	1980	1972-74	1975	1976	1977	1978	1979	1980
Internacionales Netas	660	6.428	11.413	15.317	16.139	17.070	23.291	134,9	-24,9	77,6	34,2	5,4	5,8	36,4
Monetaria	621	6.139	10.860	14.258	15.026	15.773	21.413	139,1	-27,7	76,9	31,3	5,4	5,0	35,8
Netas	39	289	553	1.059	1.113	1.297	1.878	23,2	195,9	91,3	77,4	13,5	16,5	44,8
Interno Total	12.817	24.220	32.694	37.715	45.610	55.521	68.481	10,2	41,1	35,0	15,5	20,9	21,7	23,3
Público Neto	2.583	-1.989	-2.133	-4.972	-6.531	-10.492	-12.241	-181,4	-42,8	-7,2	-133,1	-31,4	60,6	16,7
Privado	8.321	22.199	29.018	36.354	43.649	53.525	66.434	25,5	35,0	30,7	25,3	20,1	22,6	24,1
	1.913	4.010	5.809	6.333	8.492	12.488	14.288	3,3	90,3	44,9	9,0	34,1	47,1	14,4
Porcentaje del PIB)	6.119	15.539	21.463	26.368	29.925	34.998	44.790	29,8	16,1	38,1	22,9	13,5	17,0	28,0
	15,0	14,2	16,3	16,3	16,0	15,3	15,7							
Porcentaje del PIB)	2.169	4.277	5.350	5.870	6.290	7.325	8.653	23,1	5,7	25,1	9,4	7,2	16,5	18,1
	5,3	3,9	4,1	3,6	3,4	3,2	3,0							

Central del Ecuador.

	1971	1975	1976	1977	1978	1979	1980	1972-74	1975	1976	1977	1978	1979	1980
del PIB	112,1	100,0	112,9	129,9	143,3	166,1	194,9	18,9	10,0	12,9	15,1	10,3	15,9	17,3 a/
por b/	109,5	185,3	204,1	230,5	260,7	287,1	338,8	13,9	14,4	10,1	12,9	13,1	10,1	12,8

1. Credito nacional.

Proyecto Nacional de Desarrollo.

Cartera Externa en Divisas	Contratada a Final del Año							Desembolsado a Fines de 1980	
	1971	1975	1976	1977	1978	1979	1980	Total	Porcentaje
Total	410,0	779,8	1.069,2	1.786,1	2.261,1	2.964,7	3.706,5	2.671,1	72,1
de Acreedores	137,0	76,2	112,3	155,1	163,5	299,2	299,7	191,1	63,8
Privados	38,5	178,9	311,6	791,3	1.128,1	1.550,5	1.998,5	1.770,2	88,6
de Bonos	3,4	2,3	25,6	58,9	72,3	69,4	55,4	55,4	100,0
Financiamientos Internacionales	109,4	309,8	357,7	483,6	554,0	714,2	960,1	360,2	37,5
	(38,3)	(171,9)	(169,1)	(233,3)	(312,3)	(410,8)	(566,3)	(189,3)	(33,4)
	121,7	212,6	262,1	297,3	343,3	331,4	392,9	294,2	74,9

Mundial.

<u>Externa Pagadera en Divisas</u>	<u>Contratada al Final del Año</u>				
	<u>1970</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Incremento del Pago del Servicio					
a 4 años	147,1	316,6	350,9	656,6	973,4
a 9 años	91,3	158,6	297,1	432,2	735,8
años y más	108,6	303,4	377,1	663,6	547,8

<u>Porcentaje de la Deuda</u>	<u>1970</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979 a/</u>	<u>1980 b/</u>
Servicio Total en (US\$)	23,5	50,4	81,6	117,1	205,3	967,5	855,4
Servicio/Export de B. y S. (%)	10,7	5,0	6,2	8,4	13,4	44,6	33,8

Proyectos del BID (Aprobados hasta 12/31/80)

	832,9
Capital Ordinario	122,4
Capital Interregional	164,6
Fondos	453,6
Proyectos	92,3
Porcentaje (%)	100,0
Agricultura	31,6
Industria	12,0
Transportes	7,2
Energía	28,7
Educación Ciencia y Tecnología	3,1
Vivienda y Obras Urbanas	3,0
Salud	12,7
Reinversión	1,5
Otros	0,2

La cifra provisional que incluye pago anticipado de préstamos refinanciados en 1979. Si dichos préstamos fuesen excluidos, el servicio de la deuda sería US\$ 375,7 millones, es decir, 14,8 por ciento de los bienes y servicios exportados.

El Banco Central del Ecuador.

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RURAL ELECTRIFICACION PROJECT
EC-0104

I. INTRODUCTION

A. Frame of Reference

1. The electric power sector in Ecuador

- 1.01 The electric power sector in Ecuador is governed by the Basic Electrification Law, enacted in September 1973. This Law regards electrification as a national project; it holds the government responsible for planning, executing and controlling electrification through the Ecuadorian Electrification Institute (INECEL). In accordance with the Basic Law, the State alone is empowered to generate, transmit, distribute and market electric power, through INECEL; however, it can authorize the operation of private companies. INECEL's other functions expressly stipulated in the Law or taken from its guidelines, are to plan development of the national electric power sector, to interconnect and coordinate the workings of the country's power-producing plans, to set up regional electric power companies to serve as distributors and to establish the rates for electric power service.
- 1.02 In Ecuador, there are 16 electric companies and one electric power cooperative, which together market 98% of the power sold. In 15 electric power companies and the cooperative, where the State is the majority owner, INECEL is the majority shareholder, while the municipalities and certain private parties are the minority shareholders. The other companies, which serve the city of Guayaquil, are privately owned.
- 1.03 In the National Electrification Plan the basic orientation of electric power development in Ecuador has been set up into two systems: (i) the National Interconnected System; and (ii) the Regional Electric Power Systems. The first provides for the integration of the electric power supply for the Mountain and Coastal Regions, which are the most heavily populated and the site of the urban and manufacturing centers. The basic purpose is to streamline the supply of electric power by using the economies of scale of the hydroelectric projects, and in so doing eliminating a large number of small stations whose operation is not only unreliable but also uneconomical. The Regional Electric Power Systems are composed of the facilities and equipment necessary to distribute electric power in geographically-defined areas and under the management of the aforementioned regional companies. Once the National Interconnected System (SNI) is established, these companies, which now generate, distribute and market their own electric power, will be responsible for the bulk purchase, distribution and marketing of the electric power generated by INECEL.

- 1.04 With this in mind, INECEL plans to integrate the existing electric power agencies into nine Regional Electric Power Systems, whose areas of influence do not necessarily coincide with the geography of the country's political-administrative division. The nine regional electric power systems would be as follows: North, Pichincha, North-Central, South-Central, South, Esmeraldas, Manabí, Guayas-Los Rios and El Oro. There are also small, isolated supply centers that are not part of the systems. These isolated centers cover the eastern zone of the country and the Galapagos Islands.
- 1.05 Consumption of electric power in Ecuador is for the most part for residential and commercial use in the major urban centers, with the exception of Guayaquil, Quito and Cuenca, where there is a heavy concentration of industries. Electric power consumption has experienced an average annual increase of 10.3% in the 1965-1972 period and 14.6% in the 1972-1980 period. The number of individuals with electric power service varies from region to region within the country, as shown below, as a percentage and by distribution system: North, 46.5%; Pichincha, 63.0%; North-Central, 29.5%; South-Central, 29.7%; South, 24.3%; Esmeraldas, 25.6%; Manabí, 25.8%; Guayas-Los Rios, 55.3%, and El Oro, 37.7%. In general, estimates are that only 43.2% of the country's population has electric power service. The difference is even greater when the total population served is viewed from the standpoint of urban zones (87%) as compared to rural zones (13%).
- 1.06 The Development Program of the Electric Power Sector makes provision for the execution of three programs: (i) the National Interconnected System (SNI), which involves the construction of various hydroelectric stations and thermal stations, power lines and transformer substations; (ii) Regional Electric Power Systems, involving the construction of engineering works to transmit and distribute the electric power that comes from the SNI; and (iii) Rural Electrification at the national level. The investment estimated for these programs is the equivalent of US\$1.636 billion over the five-year period.
- 1.07 Ecuador's electric power sector has developed rapidly in recent years. The installed capacity for public service went from 285.3 MW in 1972 to 1,029.3 MW in 1980, which represents an average annual rate of increase of approximately 16.6% in that period. Some 99% of the electric power produced at the end of 1980 came from the public system, while 1% was privately produced. The electric power generated for public service increased 241.9% during the period 1972-1980, from 976.5 gWh to 3,338.4 gWh. Notwithstanding this increase, annual per capita production is only 408 kWh and installed capacity is 120 watts per capita. These figures are below the comparable figures for other Latin American countries. 1/

1/ Per capita installed capacity in some of the Latin American countries is as follows (in watts): Colombia (167); Chile (266); Peru (177); Brazil (235), and Uruguay (261).

- 1.08 Of all the international development agencies, the IDB has been the principal source of external financing for Ecuador's electric power sector; it has extended nine loans and provided technical cooperation for a total of US\$156.6 million, earmarked exclusively for the electric power sector. IDB resources were used to partially finance the construction of the Pisayambo Hydroelectric Station, which has a capacity of 700 MW; the Paute A and B Hydroelectric Station is currently under construction, which will have a capacity of 500MW, and the Paute transmission plant. IDB funds also financed the studies to determine the feasibility of tapping, for hydroelectric purposes, the Río Coca and the Río Guayllabamba and the Jubones Multiple Project.
- 1.09 As the loan request to which this report refers is being examined within the Bank, consideration is also being given to a request presented by INECEL for partial funding to expand the generating capacity of the Paute hydroelectric dam by 500 MW.
- 1.10 Other international development agencies such as the World Bank and USAID have participated in the funding of projects in Ecuador's electric power sector. In 1957 and 1972, the World Bank extended three loans to Quito's Electric Power Company, involving a total of US\$16.8 million, to finance three electric power projects. Recently, on July 21, 1981, the World Bank granted a loan to INECEL, for the equivalent of US\$100.0 million, for partial financing of the transmitter work of the National Interconnected System, involving the installation of 230KV and 138 KV transmission lines and the corresponding distribution substations. The loan also includes: (i) a component for a plan to train INECEL personnel and staff from the regional electric power companies; (ii) a program for institutional reinforcement of INECEL; (iii) the services of consulting engineers for the establishment of a National Electric Power Dispatch Station; and (iv) advisory services for supervision of the construction of engineering works.
- 1.11 Between 1964 and 1972, USAID extended three loans for a total of US\$5.1 million, for projects to expand the generating and transmission capability of the electric companies of Cuenca and the Santa Elena Peninsula, as well as rural electrification projects in Santo Domingo de los Colorados and other rural areas in the country.

2. Rural electrification in Ecuador

- 1.12 Rural electrification in Ecuador is the result of outlying expansions in the major urban centers of the country, effected in previous years by municipal electric power companies. With issuance of the Basic Electrification Law in 1961 and the establishment of INECEL, an effort began to integrate electric power service, first through the establishment of the regional electric power companies and recently through the regional electric power systems, which together with the engineering work done to expand the generating capacity are creating the basic infrastructure for rural electrification.

- 1.13 The electric power system in Ecuador reaches less than 44% of the national population and only 13% of the population in rural areas. With the exception of certain areas along the coast and in the mountains, Ecuador's rural sector, for all intents and purposes, does not have electric power service. This is not only detrimental to the welfare of the rural populace, but also prevents more technical and rapid development of the agricultural and livestock sector and of agroindustrial activities.
- 1.14 Aware of the need to develop programs that make possible harmonious development among the country's various sectors, as set forth in the National Development Plan, and in view of the fact that the agricultural and livestock sector constitutes one of its major sources of production and wealth, the national authorities have taken steps to draw up the National Rural Electrification Program which will make it possible to provide to Ecuador's rural population the social and economic benefits that the electric power sector has to offer. Plans are to execute the program in stages, the first of which will be carried out in the 1981-1985 period, at an estimated investment of approximately US\$80 million. It is composed of two projects: (i) the Coastal and Mountain Project, for which partial financing has been requested from the IDB and which is the subject of the present document; and (ii) the Project involving small stations for the Eastern Zone and the Galapagos, involving power production and distribution works in those zones. With implementation of the two projects that constitute the first phase of the National Rural Electrification Program, the percentage of the rural population served with electric power would increase from 13% to approximately 26%.

B. The Project

1. Objectives

- 1.15 The basic objectives of the project are to improve the living conditions of the population located in rural zones and to contribute to the development and efficiency of agricultural and livestock production. At the same time, the project would replace sources of energy, by reducing the use of hydrocarbons, which would be replaced by electric power. To achieve these ends, the tentative goal is to expand the electric power supply in the rural area of Ecuador to serve approximately 31,000 rural dwellings, involving a total of 166,000 inhabitants.

2. Description

- 1.16 The project would be carried out in rural areas that pertain to seven of the nine regional electric power systems, which cover most of the country. In keeping with the administrative division of the regional electric power system, plans have been made so that the project can be divided into subprojects, which in turn would be divided into circuits that constitute the smallest units of the project. The map that appears

at the end of this proposal shows the location of the circuits that could form part of the rural electrification project. The project involves distribution works only, and thus does not include works for electric power generation and transmission. The area to be outfitted for electric power service would be supplied by the regional electric company that has the concession for the zone where the works would be constructed.

- 1.17 The works planned under the project involve the installation of the following distribution lines: 1,300 kilometers of primary lines of 13.2 Kw and 22.8 Kw; 280 kilometers of mixed lines, and 580 kms of secondary lines. Moreover, approximately 2,700 distribution transformers would be put in place and connections, meters and installations inside the dwellings that would be hooked up to the service would be provided. Additionally, the project has made provision for the purchase of spare parts, tools and maintenance equipment for the systems.

3. The borrower and executor

- 1.18 The borrower and executor of the project would be the Ecuadorian Electrification Institute (INECEL) which, under the Basic Electrification Law that established it in 1961, is a juridical person under public law with its own assets and resources and economic and administrative autonomy, attached to the Ministry of Natural and Energy Resources (MRNE). To meet the needs with respect to planning, execution and administration of the project, there is a Rural Electrification Executor Unit (UNEPER) which is suitably organized to discharge these functions.

II. COST AND FINANCING

A. Cost of the Project

- 2.01 The total cost of the project, calculated on the basis of September 1981 prices, has been estimated to be the equivalent of US\$34,400,000. The breakdown, by category of investment and source of financing, is given below:

(In thousands of US\$ or the equivalent) 1/

<u>Category</u>	<u>IDB financing</u>			<u>Local Contribution</u>	<u>Total Cost</u>	<u>Percentage</u>
	<u>Foreign Exchange</u>	<u>Local Currency</u>	<u>Total</u>			
1. <u>Engineering and Administration</u>	1,000	-	1,000	1,740	2,740	8.0
1.1 Engineering and supervision	1,000	-	1,000	1,090	2,090	6.0
1.2 Administration	-	-	-	650	650	2.0
2. <u>Direct Construction Costs</u>	22,080	3,500	25,580	5,100	30,680	89.1
2.1 Materials and equipment	21,340	-	21,340	-	21,340	62.0
2.2 Installation of lines	-	3,500	3,500	4,400	7,900	23.0
2.3 Interior installations	-	-	-	670	670	1.9
2.4 Maintenance equipment	740	-	740	30	770	2.2
3. <u>Financial Expenditures</u>	820	100	920	60	980	2.9
3.1 Credit commission	-	-	-	60 <u>2/</u>	60	0.2
3.2 Interest	580	65	645	-	645	1.9
3.3 Inspection and supervision	240	35	275	-	275	0.8
TOTAL	23,900	3,600	27,500	6,900	34,400	100.0
	=====	=====	=====	=====	=====	=====
Percentage	69.5	10.4	79.9	20.1	100.0	

2.02 The items of the project's costs as given above individually include the provisions corresponding to contingencies and escalations.

1/ Exchange rate used: US\$1.00= S/.25.00.

2/ The credit commission would be payable in foreign currency.

B. Bases and Analyses of the Tabulation of Costs

- 2.03 For purposes of the project's analysis, technical and economic data were compiled from a representative sampling of 16 circuits, for a total of 406 kilometers, in other words, 31% of the total number of kilometers of primary lines planned under the project. The factors considered in that sampling were as follows: (a) final designs; (b) and economic return on each circuit of at least 11%; ^{1/} (c) connecting the region to the National Interconnected System; (d) execution of subtransmission works for the circuit feeder points. In connection with the last two factors, all of the regions that figure in the transmission program being partially funded by a recent World Bank loan as well as the current plan of subtransmission works in the hands of the regional electric power companies and INECEL were taken into account. The sampling consisted of circuits from both the Sierra region and the Coastal region. That sampling yielded the average values for the physical volumes of work, which were duly extrapolated, as well as the detailed lists of the equipment and materials that are the components of each basic representative unit, i.e., the circuit.

C. Financing Plan

- 2.04 The sum equivalent to US\$27,500,000 from the Bank Loan, which it is recommended be awarded with resources from the Fund for Special Operations, would be composed of US\$23,900,000 in foreign exchange and the equivalent of US\$3,600,000 in sucres. In accordance with the criteria for an energy project in a Group D country, the Bank may finance up to 70% of the total cost of the project with foreign exchange. Further, given the nature of the project and the country's classification, consideration has been given to including a local currency component in the Bank's financing, thereby increasing the Bank's financing to 79.9% of the total cost foreseen for the project.

D. Terms and Conditions of the Loan

- 2.05 The eventual Bank loan that it is recommended be granted with resources from the Fund for Special Operations would be extended under the following conditions: (i) period of amortization, 40 years; (ii) period of execution, 4 years; (iii) grace period, 10 years; (iv) interest rates during the grace period and the period of amortization, 1% and 2%, respectively; (v) credit commission, 1/2% per annum. The deadline for material initiation of the works would be 3 years as of the date on which the loan contract takes effect. The justification for this time period is given in Chapter VI.

^{1/} Exclusively for purposes of inclusion as part of the representative sampling, see paragraph 4.11.

E. Local Contribution

- 2.06 Of the local contributions to the project, as estimated, the equivalent of US\$6.9 million would come from the funds that Ecuador earmarked for rural electrification and which are managed by INECEL, and from the contributions made by the provincial councils of Pichincha and Esmeraldas. An analysis on the feasibility of the local contribution to the project appears in Chapter IV.

F. Acknowledgment of Expenditures

- 2.07 INECEL has done the engineering work necessary to define the project; the engineering work has entailed expenditures in local currency equivalent to US\$700,000 during 1980 and 1981. It is recommended that these expenditures be acknowledged as part of the cost of the project that can be charged to the local counterpart provided that when the expenses are incurred, requirements substantially analogous to those provided for in the resolution and in the loan contract have been satisfied and that those expenditures have been effected within a period of not more than 18 months prior to the approval of the loan and subsequent to presentation of the loan request (see Recommendations, paragraph 3).

III. EXECUTION OF THE PROJECT

A. Technical Aspects

- 3.01 The designs for the project have been done in accordance with standards approved by INECEL, with 13.2 KW tension for feeder lines and 240/120 volts for secondary networks. Those standards were reviewed by NRECA ^{1/} engineers and by engineers with the international consulting firm that advised UNEPER in the preparation of the final designs. For the rural housing connections, INECEL has standardized designs which include one interior installation that involves two light fixtures and two outlets.
- 3.02 The final designs for the representative sampling (406 Kms) are complete; hence, steps can now be taken to invite bids for the supply of materials for 30% of the project's works. By mid-1982, another 40% of the designs would be completed, and by the end of that year the remaining 30%. This would make it possible to call for bids on the other two phases of the project, involving similar amounts of the goods required for the project.
- 3.03 Bearing in mind the technical aspects of the project and its socioeconomic characteristics, the Bank will approve construction of each circuit as INECEL demonstrates to it that the following selection criteria have been met in each case: (a) that the final designs have been submitted, including the descriptive and technical data on the circuit;

^{1/} National Rural Electrification Cooperative Association of the United States.

(b) a cost-benefit analysis that, using the method and parameters employed in the economic assessment conducted during the project's analysis, demonstrates that the circuit yields a profit of at least 12%; (c) that it has been shown that the population centers to be supplied with electric power have access by road or equivalent hydrographic means that ensures the transit of cargo vehicles; (d) evidence that the region that depends on the circuit is connected to the National Interconnected System or can itself generate enough energy to meet circuit demands; (e) a report on the existence of the appropriate hookup point between the circuit and the transmission-subtransmission system, including the corresponding substation and the proper voltage regulation that will ensure that the circuit functions properly for 15 years (see paragraph 8.01 of Appendix 3 of this proposal).

- 3.04 Before calling each public bidding, or before the start of each subproject, documents will be submitted to the Bank that show, among other things, whether the established selection criteria have been applied when deciding on that work or group of works (Recommendations, 2 (a)).
- 3.05 In order to adjust execution of the project to the requirements that emerge as a result of application of the selection criteria, plans have been made to conduct the bidding in three groups that represent 30%, 40% and 30% respectively, of all the circuits. In turn, each package would be divided into one corresponding to the purchase of equipment and materials and another for contracting the engineering works and mounting the systems. As for the goods, the first package would be put up for bid in the first quarter of 1982 and the contract would be awarded one year later, a time period which is considered to be realistic in view of the lengthy process needed to process the approvals required from the various government agencies. The second package would be put up for bids in the third quarter of 1982 and the third package would go to bidding in the first quarter of 1983; the time period for the respective awards would be one year in both cases.
- 3.06 The dates for contracting services have been scheduled in relation to the first deliveries of materials and the respective bids would be taken in the second quarter of 1982, the first quarter of 1983 and the third quarter of 1983, thereby ensuring that construction of all of the subprojects into which the various circuits have been grouped will begin within three years of the signing of the eventual loan contract.
- 3.07 While the borrower and executor of the project would be INECCEL, the rural electrification works, once completed, would be transferred to the regional electric power companies. In return, INECCEL would receive a share in the capital of the companies that is equivalent to the cost of the works. As a consequence, operation and maintenance of the systems that would be put into service as a result of the project's execution would be the responsibility of the regional electric power companies, with advisory assistance from UNEPER, through its technical and administrative units. Nevertheless, INECCEL will undertake to see to it that

the works, equipment and facilities included in the project are managed and maintained in accordance with existing standards. To that end, for the ten years following completion of the works, it is to submit an annual report to the Bank which indicates the measures that have been taken for those purposes and a report evaluating the performance each year in terms of the level of operating efficiency and quality of service (see Recommendations, paragraph 4).

B. Institutional Aspects

- 3.08 In August 1979 INECCEL created the Executor Unit of the National Rural Electrification Program (UNEPER) to attend to the needs with respect to planning, execution and administration of this project and of INECCEL's other national rural electrification projects. To carry out its functions, the Executor Unit of the Rural Electrification Program is organized as follows: (a) an Office of the Technical Superintendent composed of two Technical Division, one for the IDB Project in the Sierra and on the Coast and another for the eastern part of the country, the Galapagos and isolated systems; (b) and Administrative Division composed of five departments: Organization and Supervision, Promotion, Warehousing, Acquisitions and Cashiers' Office; and (c) a Programming and Control Office. The chief of the unit is the Rural Electrification Director.
- 3.09 The Technical Division (Mountains and Coast), IDB Project, has 45 staff members in the following areas of specialization: engineers (14), engineering assistants (9), and economist (1), a psychologist (1), an attorney (1), a technologist (1), administrative personnel (4), and 14 clerks. UNEPER has developed an organization structure where functions and responsibilities are distributed in a manner appropriate to fulfillment of its objectives.
- 3.10 For all intents and purposes, distribution and marketing of electric power in Ecuador are handled by 15 electric power companies, organized as stock companies, where the state, through INECCEL, is the major stockholder. INECCEL's share in the capital of the electric power companies varies from 54.4% to 98.7%. Most of the other stockholders are the respective Provincial Councils or the townships. There is only one private electric power company in Ecuador, which serves the Guayaquil area. It has a concession until 1985.
- 3.11 The operating characteristics of the electric companies (see description in paragraph 5.57 of the project report) differ considerably from one company to another, thus causing wide variations in the distribution pattern. The averages indicate that the companies have 93 subscribers for each employee; sales amount to approximately 267 KWh per employee; and consumption per user for the companies as a whole is equivalent to about 2,840 KWh. Examination of the data available also indicates that the ratio of energy sales to each employee of INECCEL subsidiaries is very low in comparison to that of the company serving the Guayaquil area (EMELEC).

- 3.12 Efficiency of the regional electric companies is not expected to improve in the near term. The situation would, however, improve gradually in accordance with the goals established by the Electrification Master Plan, which call for consolidation of the 16 utility companies into 9 regional electric systems, with INECEL taking a more active role in supervising their performance. Furthermore, an institutional development subproject was included in conjunction with a recent World Bank loan operation which would upgrade the financial, administrative, and project planning and control areas of the regional electric companies, thus helping to remedy the present situation.

C. Financial Aspects

1. INECEL

- 3.13 During the period analyzed, INCEL's economic-financial status was unfavorable, characterized by negative economic performances principally due to rates that were too low to cover the expenditures involved in operating and producing a return sufficient to cover the financial requirements that result from the expansion program and payment of its obligations with credit institutions. To cover that shortfall, the company has had to resort to external funds received in the form of royalties and loans to support its financial operations. The foregoing notwithstanding expectations are that the recent measures ordered with respect to rate policy will make it possible to reverse the adverse economic trends of recent years within a reasonable period of time, which would extend tentatively until 1983. However, to fully carry out its investment program, from the financial standpoint the company would require, for the duration of the next decade, eventual transfers of resources from the national budget or other alternative measures.

2. Regional electric power companies

- 3.14 Analysis of the electric companies Statements of Earnings shows that of a total of 17 companies, 7 had losses from their 1980 operations, while 10 had profits. Of the latter, five received less than a 2% return on their net worth; only one received over 10%. The analysis of the limited financial data available does not allow one to draw any conclusions that explain the performances of the companies as a whole, due to the fact that correlations do not exist in a sufficient number of cases.
- 3.15 From the standpoint of rates, one notes that 5 of the 10 companies that had profits charged rates over the equivalent of US\$0.07 per kWh, and that only two companies had rates below US\$0.05 per kWh; the foregoing would place the subgroup showing a surplus at the highest levels with respect to the group of companies observed. However, as in the case of the volumes of power sold, this does not seem to be an exclusive determining factor of a positive performance, since there are companies among those that experienced losses that charged a relatively high rate: Esmeraldas (US\$0.0728), Manabí (US\$0.0772) and Los Ríos (US\$0.0792).

- 3.16 While complete and up-to-date data on Ecuador's electric power sector as a whole is not available as yet, it is known that each company's collections are adversely affected by the considerable delay on the part of the national, provincial and municipal public sector in paying the bills submitted by the electric power companies on time. One estimate prepared by INECCEL, as of December 31, 1980, shows that the cumulative total of accounts receivable amounts to the equivalent of US\$29.4 million, of which approximately 36% (US\$10.5 million) is owed by the public sector. Moreover, estimates are that no less than half of those balances correspond to accounts that fell due several years ago. Since this has a very adverse effect on the companies' liquidity and their capacity to provide service, intensive efforts have been made to see to it that the Basic Electrification Law is applied. That law requires that the budget of entities of public law include items to pay for their consumption of electric power and for effective payment of that power. Failure to make the payment means that the Office of the State Comptroller must formulate the respective charges to the responsible treasurers. Despite the existence of these provisions and repeated overtures to the Ministry of Finance and Public Credit, the amounts owed for consumption of electric power by public agencies have increased steadily, although the electric power companies themselves cannot cut off the supply of electric power.
- 3.17 During its recent visit to Ecuador, the Analysis Mission told national authorities of the Bank's concern over this situation. The Minister of Finance said that, in reference to autonomous agencies and units of the central government, shortly, a mechanism will be set up to rectify the problem. That mechanism could be in the form of trust contracts between the debtor institutions and the Ministry of Finance, which would proceed to withhold and deposit in the name of the various electric power companies the sums agreed upon for amortization of the consolidated debt of each agency. For other autonomous agencies where the government has no jurisdiction - the provincial councils, municipalities, etc. - forming the autonomous sectional system, INECCEL, acting through the regional electric companies, accepts that responsibility. To that end, in the present operation, as in the Phase C Paute operation, a clause will be included in the respective loan contract whereby the guarantor and INECCEL undertake to present to the Bank, prior to the first disbursement, an analysis of the balances owed to the electric power companies as of December 31, 1981, by entities of public law, indicating the length of time those balances have been outstanding, and the date by which those balances, plus any interest due by virtue of default, must be paid. In the case of public units of the central government, that date shall be no more than 12 months after the date of the signing of the respective loan contracts, while for units of the autonomous sectional system the limit will be 18 months. Further, such agreements shall specify the mechanism to be employed in the future for punctual payment of the electric power bills (see proposed resolution, paragraph 8(c)(i)(2) and (ii)). In both cases, an additional three-month term will be set for the borrower and the guarantor to submit evidence that the aforementioned balances outstanding and the corresponding interest charges have been collected (see Recommendations, paragraphs 6 and 7).

D. Legal Aspects

- 3.18 The fundamental works of the project will affect lands located adjacent to the access roads into the towns to be supplied with electric power. According to the legislation in force, to carry out those works it would be necessary to have the corresponding easement for electric power transmission, which would be easy to obtain once INECCEL so establishes it for purposes of the project.
- 3.19 The loan contract would include a commitment on the part of the borrower to present to the Bank, before bids are called or before the start of the works, evidence to the effect that it has legal possession or the necessary easements for on the lands where the works would be constructed (see Recommendations, paragraph 1 (b)).

IV. JUSTIFICATION OF THE PROJECT

A. Technical Viability

- 4.01 To analyze the project, technical and economic data were compiled from a representative sampling of 16 circuits, for a total of 406 kilometers, in other words, 31% of the total number of kilometers of primary lines planned under the project. From that sampling average values for the physical volumes of works were obtained, which were properly extrapolated, as well as detailed lists of the equipment and materials that are the components of each basic representative unit, i.e. the circuit.
- 4.02 The standards used in preparing the construction designs, which are regarded as adequate for works of this type, are those established by INECCEL. They were subsequently updated by the Executor Unit (UNEPER) with advisory assistance from an international consulting firm. Those standards were also reviewed by experts from the NRECA of the United States and approved by all the regional electric power companies.
- 4.03 Among other factors, the following indicate efficient execution of the project: (i) the logistical support that the warehouses of the UNEPER would provide, which will allow for better and more efficient control of the movement of materials and equipment; (ii) the opportunity provided by dividing the acquisition of materials and equipment into three packages that represent 30%, 40% and 30%, respectively, of all the circuits. Each package would be divided into the same proportions for the contracting of the engineering works and mounting of the systems.
- 4.04 The regional electric power companies that would maintain the electric power systems included in the execution of the project are equipped to perform that activity; to that end, the planned acquisitions include the purchase of tools and measuring equipment, which would become the property of the regional electric power companies once the works have been completed.

B. Institutional Viability

- 4.05 The view is that the project execution is viable from the standpoint of administrative-accounting organization, since the Executor Unit already set up and attached to the Office of the General Manager of INECEL which would be directly responsible for execution of the project, has sufficient experience and organization to manage the project adequately. Further, for purposes of supervision and technical control of the work, the Executor Unit will have the services of a specialized consulting firm.

C. Financial Viability

- 4.06 As indicated earlier, the local counterpart funds for execution of the project come from income established in three Government Decrees, whose operating regulations make INECEL responsible for monitoring and auditing collections. For those purposes, as they are collected the funds earmarked to finance the National Rural Electrification Program will be centralized in special accounts opened in the National Development Bank or in the Central Bank of Ecuador, as appropriate.
- 4.07 The income resulting from Ministerial Decree 051 and from Decree 306 must be deposited in the Central Bank and in the National Development Bank, respectively, according to the amounts collected by each regional electric power company. In accordance with the regulations planned, the treasurer of the electric power company must file a monthly report with INECEL on the deposits made. The income from Decree 459-B for the Special Fund for hooking low-income consumers into the service will be deposited in a special account in the Central Bank of Ecuador.
- 4.08 Based on projections of the resources that will come from those sources and the local contribution requirement for the project, it is felt that there are sufficient resources to handle execution of the project. This judgment is based on the actions that INECEL must take to apply the regulations of each one of the decrees to the regional electric power companies. Decree 306 will remain in effect until March 1983, although the government is considering the idea of extending the decree permanently. Moreover, the resources to be obtained on the basis of Agreement 051 will not be used as they have been in the past, since the percentage of that fund that must be earmarked for rural electrification funds has not gone to INECEL in previous fiscal periods, but rather has been retained by the regional electric power companies.
- 4.09 In view of the foregoing background information and to ensure opportune and complete security of the local counterpart to the project, a clause will be included in the eventual loan contract whereby INECEL, before each call for bids for the purchase of materials, must demonstrate the following to the Bank's satisfaction: (a) that before calling for bids for construction and mounting of circuits to which the materials to be purchased correspond, it will have available the local contribution to

finance the mounting of those circuits; (b) before calling for bids for construction and mounting of each group of circuits, INECCEL must demonstrate to the Bank that the resources to finance the local contribution for construction and mounting of those circuits are available in cash in the project account (see Recommendations, paragraph 2).

D. Economic Viability

- 4.10 The economic evaluation conducted establishes the need for the project in the areas to be supplied with electric power in such a way that the real demand in the amounts foreseen is assured. Further, it is felt that the types of electrification that will be carried out are the most economical for the country. In other words, the projects works are, generally speaking, the minimal cost solution.
- 4.11 The circuits to be constructed have been selected and mapped out on the basis of socio-economic criteria and the view is that if carried out in accordance with the standards establishes in this report they will improve the living conditions of the beneficiary rural population. The cost-benefit analysis establishes that most of the circuits in the representative sampling have a return of 12%. There were only a few that had slightly lower rates of return and were considered within the sampling in view of the fact that the characteristics of works of this type are such that with minor adjustments in the layout of the circuits the internal rates provided for in the selection criteria can be easily achieved. In that regard, eventually only those circuits that manage to obtain a rate of return of 12% could be included in the project in the final analysis.
- 4.12 Most of the beneficiaries of the project are low-income inhabitants. The average per capital income in the zones where the project is to be executed is S/.10,500, which is below the Bank's reference figure of S/.13,200 (US\$528, at 1979 prices). Some 84% of the beneficiaries have incomes below that reference figure.

E. Justification for the Use of the FSO

- 4.13 The use of the resources of the Fund for Special Operations is justified on the basis of the following considerations: (a) the lowest income population in the project's zone of influence accounts for 84.4% of the total; (b) 70% of the benefits that the project would generate would be received directly by the lowest-income sectors; (c) the project's zone of influence would be the rural zones in the Coastal and Mountain area, whose electrification rates are low and who for all intents and purposes have no electric power service.
- 4.14 Finally, it should be pointed out that in accordance with the provisional guidelines for the use of the liquid resources of the FSO in 1981-1982 (Document GP-82-8 of March 20, 1981), since this is a rural electrification project, 100% of the financing in foreign currencies should come from the Fund for Special Operations.

V. ASSESSMENT OF EARLIER LOANS TO INECEL

A. Background

5.01 The Bank has awarded the Republic of Ecuador a total of 9 loans and one technical cooperation operation to finance studies and/or the execution of investment projects in the electric power sector, for a total equivalent to US\$156.6 million. All these projects have been executed by INECEL and are as follows:

<u>No. of Operation</u>	<u>Date of Approval</u>	<u>Project</u>	<u>Amount in thousands of US\$</u>	<u>Percentage Disbursed as of IX/30/81</u>
314/SF	XI/26/71	Pisayambo Station	16,200	100
18/CD	XI/26/71	" "	8,860	100
315/SF	XI/26/71	Paute Studies	2,700	100
411/SF	IX/26/74	Paute A and B	16,500	46
271/OC	IX/26/74	" " " "	33,500	95
412/SF	IX/26/74	Río Coca Study	1,500	100
323/OC	XII/9/76	Transmission Paute A & B	25,000	40
492/SF	XII/9/76	Río Guayllabamba Study	1,600	100
38/IC	XI/ 9/78	LCC-Paute A & B & Transmission	50,000	40
ATC/TF(SP)- 1354-EC	IX/ 1/75	Rio Jubones Study <u>1/</u>	760	100
		TOTAL	156,620	
			=====	

5.02 In general terms, the view is that the projects assigned to INECEL have been executed satisfactorily. Further, the delays in the Paute A and B project which occurred at the beginning of its execution and which were due largely to changes in the designs of the dam that had repercussions on the timetable originally set for the bids, have been overcome and the project has continued to progress satisfactorily.

5.03 As for fulfillment of the terms contained in the loan contract as listed in paragraph 5.01 above, in general it is felt that the borrower and INECEL have complied with those terms, with the exception of those that concern certain financial aspects of the company and rates. Within this context, special attention should be addressed to the clauses that establish the obligation to maintain rates sufficient to guarantee a level of return to INECEL and to the regional companies and the SNI.

5.04 When the loans for the Pisayambo project were approved, the following conditions were established:

1/ This is a prefeasibility study on a multipurpose project.

1. Clause 5.06 of contract 314/SF-EC, and 5.05 of contract 18/CD-EC:
"Rates. The Republic undertakes to adopt the appropriate measures acceptable to the Bank so that: (a) The rates charged for electric power from the Pisayambo I system from the time it goes into operation: (i) should produce at least enough resources to cover all the operating expenditures of the respective system, including those related to administration, operation, maintenance and depreciation; (ii) should provide a reasonable return on the system's fixed investment, and (iii) if the flow of funds is not sufficient to cover the timely amortization of all obligations charged to those companies (the rates) must generate the additional resources necessary to that end.
 2. Appendix B in the two contracts, Section VII:
"Rates. For purposes of the provisions of Section 5.06 of contract 314/SF-EC and Section 5.05 of loan contract 18/CD-EC, the rates of the Pisayambo I hydroelectric system must be established in such a way that they produce a profit of at least 7% per annum as of the point in time when substantially all the electric power that can be generated by that system is sold."
- 5.05 As explained in greater detail in paragraphs 7.17 to 7.19 of the Project Report, because the power generated by the Pisayambo and Paute station, as well as the power generated by other thermal stations owned by INECEL and the regional companies, goes into this national system it is difficult if not impossible to measure the power consumed by source stations, which would make it impossible to determine the profit from each one of the stations.
- 5.06 It seems more logical to address these requirements to the system as a whole so that the conditions with respect to maintenance of adequate rates and the financial return to INECEL and the regional companies that it is proposed be included in the loan contracts for project Paute "C" and rural electrification would be designed to see to it that these entities maintain rates sufficient to guarantee a satisfactory rate of return on all the operations of each company.
- 5.07 The foregoing is in keeping with what INECEL negotiated with the World Bank at the time of approval of the loan of US\$100 million for the transmission system. There is a reasonable possibility that both INECEL and the regional companies will be able to meet these terms. To that end, the necessary changes will be submitted by the short procedure at the time the Paute C and rural electrification projects are considered by the Board of Executive Directors.

VI. SPECIAL ASPECTS

- 6.01 It is felt that a three year period should be recommended for the material start of the works involved in the project in view of the need to

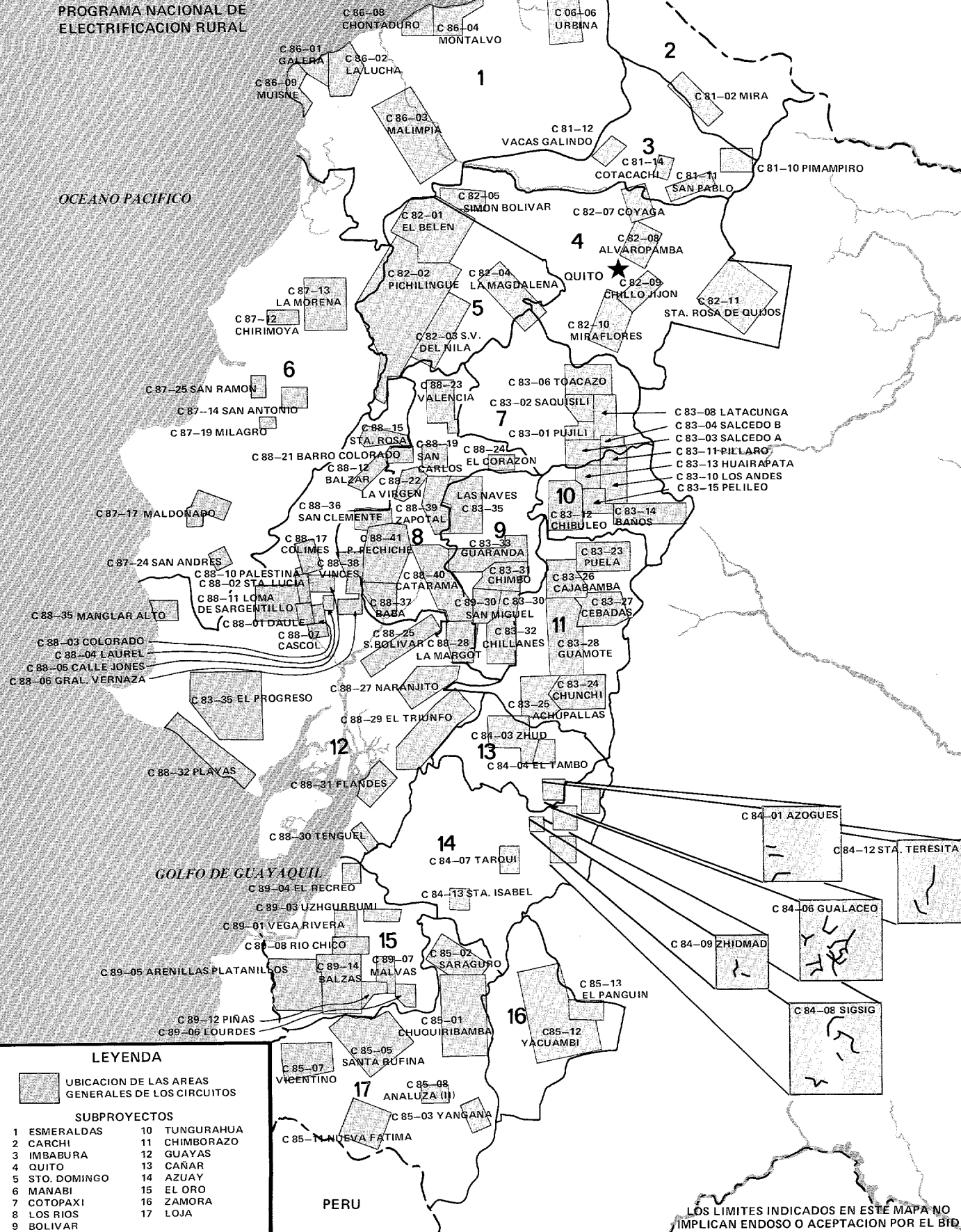
comply with the criteria established with respect to the dates on which the feed-in points will be available and when the region to which the circuit belongs will be supplied with electric power from the National Interconnected System. Moreover, according to the schedule for public bidding on the procurement of materials and installation, bidding on the last lot of materials and equipment for the project and award of the installation contracts would take place at the end of the second year following the date of the prospective loan contract. Work could therefore be started on all circuits within three years. Accordingly, once the final works have been initiated, their construction is expected to take 8 to 10 months, so that the project's period of execution could be extended into the fourth year from the signing of the loan contract, which is considered to be sufficient time to discharge and pay for all documents attesting to completion of work. In this particular case, preparation of the designs is not a limiting factor in execution, since they are well on their way toward completion. As pointed out earlier, they would be completed at the end of 1982.

ECUADOR

UBICACION GENERAL DE LOS CIRCUITOS
PROGRAMA NACIONAL DE
ELECTRIFICACION RURAL

COLOMBIA

OCEANO PACIFICO



PROPOSED RESOLUTION 1/

ECUADOR. LOAN /SF-EC TO THE INSTITUTO ECUATORIANO
DE ELECTRIFICACION (INECEL)
(Rural Electrification Project)

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Instituto Ecuatoriano de Electrificación (INECEL), of Ecuador, as borrower, and the Republic of Ecuador, as guarantor, for the purpose of granting the former financing to cooperate in the execution of a Rural Electrification Project. This financing shall be subject substantially to the following conditions:

1. Amount and Currencies: Up to US\$27,500,000 or the equivalent in other currencies which are part of the Fund for Special Operations of the Bank, of which amount: (a) up to US\$23,900,000 or the equivalent in other currencies (except that of Ecuador) shall be to pay for goods and services acquired through international competition in the member countries of the Bank and for such other purposes as may be specified in the loan contract; and (b) up to the equivalent of US\$3,600,000 shall be in sucres to cover local expenses. Payments of amortization and interest shall be made in the currencies disbursed.
2. Source of Funds: The Fund for Special Operations.
3. Guarantee: Joint and several guarantee of the Republic of Ecuador.
4. Credit Fee: 1/2 of 1% per annum on the undisbursed portion of the amount indicated in subparagraph 1(a) of this resolution, commencing to accrue 12 months after the date of this resolution. The fee shall be payable in dollars of the United States of America on the same dates as the interest.
5. Amortization: The borrower shall amortize the loan in a period of 40 years from the date of the contract, by means of 60 consecutive, semiannual and, insofar as possible, equal installments. The first installment shall be paid 10-1/2 years after the date of the contract.

1/ The provisions contained in this Appendix and in Appendices 2 and 3 will be final only when the Board of Executive Directors has approved the loan proposal.

6. Interest: 1% per annum during the first 10 years from the date of the contract and 2% per annum thereafter. Interest shall be payable semiannually on principal amounts outstanding, and the first payment shall be made six months after the date of the contract. At the request of the borrower, resources of the financing may be used to pay the interest during the disbursement period.
7. Physical Initiation and Disbursement: The period for physical initiation of all the subprojects shall expire three years after the effective date of the contract, and the period for disbursement of the financing shall expire four years after the same date.
8. Special Conditions:
 - (a) The resources of the loan shall be utilized in their entirety by the borrower. If modifications in the legal provisions or the basic regulations concerning the borrower, or in Decrees 306 and 459-B of 1975, or in Ministerial Decision 051 of 1979, or in the "Reglamento para la Fijación de Tarifas de los Servicios Eléctricos" are approved which, in the opinion of the Bank, may substantially affect the Project, the Bank may take such measures as it deems appropriate in accordance with provisions to be set forth in the loan contract.
 - (b) The resources of the loan shall be used to participate in the execution of the Project, the cost of which is estimated at the equivalent of US\$34,400,000, and in no case may the participation of the resources of the loan exceed 79.9% of the total amount of the Project. Consequently, the loan contract shall contain such provisions as the Bank deems appropriate to ensure that such additional resources as may be necessary for the complete execution of the Project shall be duly provided, in an amount estimated at the equivalent of US\$6,900,000, in accordance with a schedule of investments satisfactory to the Bank.
 - (c) Prior to the first disbursement of the financing, the following requirements shall be met:
 - (i) The borrower shall present to the Bank: (1) evidence that the borrower has contracted, in accordance with terms of reference and procedures acceptable to the Bank, for the services of a consulting firm to collaborate with the borrower in supervising the execution of the Project (Paragraph 4.07); and (2) a detailed plan in which: (aa) an analysis showing the aging of the balances due from the agencies of the "Régimen Seccional Autónomo" to the regional electric companies as of December 31, 1981, is included; (bb) deadlines are established (which must not exceed 18 months after the date of the loan contract) for the agencies to pay these amounts plus the corresponding interest to the electric companies; and (cc) measures are established to ensure the timely collection of the amounts owed by the sectional agencies to the regional electric companies for electric service rendered.

- (ii) The guarantor, through the Borrower, shall submit to the Bank a detailed plan in which: (1) an analysis showing the aging of the balances owed by public agencies to the regional electric companies as of December 31, 1981, is included; (2) deadlines are established (which must not exceed 12 months after the date of the loan contract), for agencies of the public sector to pay these amounts plus the corresponding interest to the electric companies; and (3) measures are established to ensure the timely collection of the amounts owed by the public agencies to the regional electric companies for electric service rendered. (Paragraph 5.66)
- (d) In the acquisition of machinery, equipment and other materials for the Project and in the awarding of construction contracts, the system of public bids shall be followed in each case in which the value of such acquisitions or contracts exceeds the equivalent of US\$100,000. The bidding shall be subject to the procedures to be set forth in an annex to the loan contract. (Paragraph 4.17)
- (e) The provisions of paragraph (d) above notwithstanding, the borrower may execute the installation of circuits in the Project by force account, up to an amount estimated at the equivalent of US\$800,000, chargeable to the local counterpart contribution, provided that the circuits in question are small or are located in remote localities and that the Bank states in each case that it has no objection. (Paragraph 4.16)
- (f) The borrower and the guarantor shall take appropriate measures to ensure, to the satisfaction of the Bank, that the rates for the supply of electricity by the regional electric companies:
 - (i) produce sufficient revenues to cover all the operating expenses of the respective systems, including those related to the purchase or production of energy (as the case may be), administration, operation, maintenance and depreciation, and (ii) yield a reasonable annual rate of return on net revalued fixed investment in the respective systems. If the foregoing does not generate sufficient revenues to cover the timely service of all the obligations of the regional electric companies, the borrower and the guarantor, in conjunction with the regional electric companies, shall take the necessary measures to obtain such additional resources as shall be needed for that purpose. (Paragraph 5.25)
- (g) The Bank shall establish such inspection procedures as it deems necessary to assure the satisfactory execution of the Project, and the borrower and the guarantor shall extend all cooperation which is required for the most effective accomplishment of this purpose. From the amount of the financing the sum of US\$239,000 and the equivalent of US\$36,000 in sucres shall be allocated for credit to the accounts of the Bank to meet expenses of inspection and supervision.

RECOMMENDATIONS

- A. It is recommended that the following conditions, to be met to the Bank's satisfaction, be included in the loan or guarantee contracts, as appropriate, in addition to the conditions set forth in the proposed resolution:
1. Unless the Bank shall otherwise agree, prior to each public call for bids or, when works are to be executed by force account, prior to the start of such works, the borrower shall present to the Bank, as applicable:
 - (a) the general plans, specifications, budgets, specific bidding requirements and any other documents required for the call; and
 - (b) only in the case of construction, evidence of legal possession of or easements or other rights to the lands required for the construction in question. (Paragraph 4.25)
 2. In addition to the requirements set forth in Recommendation A.1 above, and on the occasion therein set forth, or on the occasions set forth in paragraphs (b) and (c) below, as appropriate, the borrower shall present to the Bank:
 - (a) for each subproject, the documents pertaining to its selection, to which reference is made in paragraph 8.01 of Annex A (Appendix 3 to Loan Proposal); (Paragraph 4.12)
 - (b) prior to the calls for bids for the acquisition of materials, evidence that the borrower will have available the corresponding local contribution in order to finance the construction and installation of the circuits for which the materials are being acquired; and
 - (c) prior to the call for bids for construction and installation of each group of circuits, evidence that the resources to finance the local contribution for construction and installation of such circuits are available in cash in the Project account. (Paragraph 6.15)
 3. The Bank may recognize as part of the counterpart contribution for the Project, engineering, administration and general costs, up to a total amount equivalent to US\$700,000, made by the borrower during the 18 months prior to the date of the resolution but after the date of the loan request, provided that requirements substantially similar to those set forth in the resolution and in the loan contract have been fulfilled. (Paragraph 4.21)
 4. The borrower shall undertake:
 - (a) that the works, equipment and installations included in the Project will be administered and maintained in accordance with generally accepted technical standards; and

- (b) to present to the Bank, during a period of 10 years from completion of all the works and installations of the project and within the first three months of each calendar year: (i) an annual plan for maintenance of the rural electrification system; and (ii) a detailed report on maintenance operations carried out in the previous year and on the degree of operational efficiency and quality of the service and status of conservation of the system at the end of the preceding year. The borrower shall take the necessary steps to ensure that the regional electric companies include in their corresponding annual budgets the resources required for these purposes. (Paragraph 4.29)
5. Within a period of 6 months from the effective date of the contract, the borrower shall present to the Bank the final plan, with its corresponding schedule of application, for the campaign to promote the Project and to educate the users located in the Sierra and Costa regions for the purpose of encouraging the efficient use of electricity for productive aims. The plan shall be applied in accordance with the schedule approved by the Bank. (Paragraph 4.28)
6. Within a period of 15 months from the effective date of the loan contract, the guarantor, through the borrower, shall demonstrate that the amounts referred to in clause 8(c)(ii)(2) of the Proposed Resolution (Appendix 1) have been collected. (Paragraph 5.66)
7. Within a period of 21 months from the effective date of the loan contract, the borrower shall demonstrate that the amounts referred to in clause (8)(c)(i)(2)(bb) of the Proposed Resolution (Appendix 1) have been collected. (Paragraph 5.66)
8. Within a period of 12 months from the effective date of the loan contract, the borrower shall present to the Bank:
- (a) the baseline data for the categories set forth in paragraph 7.01 of Appendix 3 to this document; and (Paragraph 4.31)
 - (b) a description of the system for compiling and processing the data to be used for making the annual comparisons with the baseline data so as to evaluate the results achieved through execution of the Project. (Paragraph 4.31)
9. The borrower shall submit the annual comparative data mentioned in paragraph A.8 above to the Bank on an annual basis for three years. (Paragraph 4.32)
10. At the end of the third year after the date of the last disbursement, the borrower shall present an ex post evaluation report on the results of the Project, based on the methodology and guidelines agreed upon with the Bank, which is similar to the one used in the ex-ante evaluation of the project. (Paragraph 4.33)

11. The following provisions shall be observed with respect to financial statements:

- (a) The following shall be presented annually to the Bank: (i) the financial statements of the borrower, during the life of the contract; (ii) those of the Project, during its execution; and (iii) those of regional electric companies, from the year in which each of them receives the last of the circuits under its jurisdiction until 10 years after the date of the last disbursement.
- (b) The statements referred to above shall be presented certified by an independent firm of public accountants selected by the Contraloría General del Estado and acceptable to the Bank. Notwithstanding the foregoing, the borrower and the Bank may agree that the Contraloría General del Estado perform the audit. The first financial statements referred to in A.11(a)(i) and (ii) above, shall be those pertaining to the fiscal year in which the execution of the project begins. (Paragraph 5.22)

B. An annex substantially similar in content to Appendix 3 hereto (The Project) shall be included in the loan contract.

THE PROJECT
(Annex A to Loan Contract)

I. Purpose

- 1.01 The basic objectives of the project are to improve the living conditions of the population in rural areas and to contribute to the development and efficiency of agricultural and livestock production. To achieve these purposes, the tentative goal is to extend the supply of electricity in the rural areas of Ecuador to approximately 31,000 additional rural dwellings with a total of about 166,000 inhabitants.

II. Description

- 2.01 The project will be executed in the regional electric systems located in the Sierra and Coastal regions. It is planned to group the works into subprojects and to divide these, in turn, into circuits. The circuits will be the smallest units in the Project.
- 2.02 The works envisaged will consist approximately in the installation of the following distribution lines: 1,300 kilometers of 13.2 Kv and 22.8 Kv primary lines; 280 kilometers of mixed lines; and 580 kilometers of secondary lines. In addition, approximately 2,700 distribution transformers will be installed, and house connections, meters and inside wiring will be provided in the dwellings connected. There is also a provision for the acquisition of spare parts, tools and equipment for maintenance of the systems.

III. Cost

- 3.01 The total cost of the project is estimated at the equivalent of approximately US\$34,400,000, as shown in the following table of cost and financing:

(in US\$ thousands or equivalent)

Category	Financing				BORROWER	Total Cost	%
	B A N K		Total				
	Foreign Exchange	Local Currency					
1. <u>Engineering and Administration</u>	1,000	-	1,000	1,740	2,740	8.0	
1.1 Engineering and work supervision	1,000	-	1,000	1,090	2,090	6.0	
1.2 Administration	-	-	-	650	650	2.0	
2. <u>Direct Construction Costs</u>	22,080	3,500	25,580	5,100	30,680	89.1	
2.1 Materials and equipment	21,340	-	21,340	-	21,340	62.0	
2.2 Installation of the lines	-	3,500	3,500	4,400	7,900	23.0	
2.3 Inside installations	-	-	-	670	670	1.9	
2.4 Maintenance equipment	740	-	740	30	770	2.2	
3. <u>Financial Costs</u>	820	100	920	60	980	2.9	
3.1 Credit fee	-	-	-	60	60	0.2	
3.2 Interest	580	65	645	-	645	1.9	
3.3 Inspection and Supervision	240	35	275	-	275	0.8	
TOTALS	23,900	3,600	27,500	6,900	34,400	100.0	
Percentages	69.5	10.4	79.9	20.1	100.0		

IV. Bidding

- 4.01 When goods to be acquired or services to be contracted through public bidding are to be financed in whole or in part with foreign exchange from the financing, the bidding procedures and specific bidding requirements shall permit unrestricted participation of goods and services originating from member countries of the Bank. Consequently, no conditions that would preclude or restrict the offer of goods or the participation of contractors originating in such countries shall be imposed through such procedures and specific requirements.

V. Selection and Contracting for Consulting Services

- 5.01 In selecting and contracting for consulting services to be financed in whole or in part with funds from the financing, no provisions may be established that would restrict or preclude the participation of consultants originating in member countries of the Bank.

VI. Tariffs and rates of return

- 6.01 The rates of return on net revalued fixed investment of the systems of the respective regional electric companies, referred to in paragraph 8(f)(ii) of the resolution (Appendix 1 to this proposal), shall be as follows: (a) 4% in 1982; (b) 8% in 1983; and (c) 8.5% from 1984 onward. The rate of return shall be calculated for each calendar year following the procedures set forth for the purpose in the "Reglamento para la Fijación de Tarifas de los Servicios Eléctricos".

VII. Ex Post Evaluation

- 7.01 In order to evaluate the socioeconomic effects of the project, an ex post analysis thereof shall be made. The analysis shall cover the following aspects, among others:
- (1) Costs: (a) investment; (b) operation and maintenance; (c) administration (meter-reading, billing and collections); (d) purchase of energy; and (e) costs per subscriber, for each circuit.
 - (2) Technical Data: (a) losses, differentiated; (b) voltage drops; and (c) annual growth in demand.
 - (3) Benefits and the Beneficiaries: (a) substitutions in consumption; (b) evaluation of consumption and of load per customer, in monthly volume and value, by income category; (c) fixed contributions from users to cover project and installation costs; (d) number of consumers connected, by circuit and by regional company; (e) non-residential use; and (f) social and community services introduced after the Project.
- 7.02 The initial basic data for the evaluation may be obtained through a survey of the circuit, in the Sierra and the Coast.

VIII. Selection Criteria

- 8.01 In order for the Bank to authorize the construction of each circuit, the borrower shall demonstrate to the Bank that the following selection criteria have been satisfied with respect to each:
- (a) the final designs, including the descriptive and technical information on the circuit, have been presented;
 - (b) the cost-benefit analysis, based on the methodology and parameters agreed upon with the Bank, has shown the rate of return of the circuit to be at least 12%;
 - (c) it has been shown that the communities to be included in the project have access by road or water which allows circulation of cargo vehicles;

- (d) it has been demonstrated that the region to be served by the circuit is linked to the Interconnected National System, or it has the generation capacity sufficient to meet the requirement of the circuit; and
- (e) it has been shown that there is a suitable point for connection of the system with the transmission-subtransmission system, including the corresponding substation and appropriate voltage regulation. The report must show that the circuit will be able to operate properly during the next 15 years.