

PUBLIC

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

COLOMBIA

**LOAN TO EMPRESAS PÚBLICAS DE MEDELLÍN
FOR THE CONSTRUCTION OF THE PLAYAS HYDROELECTRIC PLANT**

(CO0162; 70/IC-CO)

LOAN PROPOSAL

1980

Datos Socioeconómicos Básicos de Colombia

1. Datos Generales

Población total (millones de habitantes, 1978)	25
Población rural %	28,7
Extensión territorial (miles de Km2)	1.141,7
Habitantes por Km2	22
Tasa de natalidad - 1978 (por mil)	29,1
Tasa de crecimiento demográfico (promedio 1970-78) %	2,7
Producto interno bruto por habitante 1978 (US\$ de 1976)	637,1
Tasa de mortalidad por mil habitantes (1976)	7,6
Tasa de mortalidad infantil por mil nacidos vivos (1976)	59,6
Médicos por 10.000 habitantes (1977)	5,1
Número de camas de hospital por cada mil habitantes (1976)	1,8
Alfabetismo (1974)	77,6
Tasa de inscripción (%) <u>1/</u> (1977)	
Primaria	71,2
Secundaria	58,1
Tasa de cambio (Setiembre 1980)	US\$ 1 = 48,92

Tenencia de la tierra en %:

<u>Tamaño</u> (has.)	<u>No. de Explotaciones</u>		<u>Superficie</u>	
	<u>1960</u>	<u>1970/71</u>	<u>1960</u>	<u>1970/71</u>
Menos de 10	76,5	73,1	8,7	7,2
de 10 a 100	20,0	22,5	25,2	25,3
más de 100	3,5	4,4	66,1	67,5
Total	100,0	100,0	100,0	100,0

Consumo de energía per cápita (1978) Kwh 720

Población Económicamente Activa por Sectores (1973):

	<u>En miles</u>	<u>%</u>
Total	5.975	100,0
Agricultura y pesca	2.163	36,2
Minería	43	0,7
Manufactura	964	16,1
Construcción	289	4,8
Comercio, finanzas y seguros	938	15,7
Servicios	1.153	19,3
Otros	425	7,2
Tasa de desempleo (Setiembre 1978)		8,2
Tasa de desempleo (Setiembre 1979)		9,0
Tasa de desempleo (Diciembre 1979)		8,6
Tasa de desempleo (Marzo 1980)		10,8

1/ Matrícula total/población en grupo de edad elegible.

Producto Interno Bruto por Gasto a/
de mercado)

Productos de mercado
Interna bruta

Productos
Productos

Productos (a precios de mercado)

Productos

Productos

Productos

Productos y comunicaciones

Productos

Banco de la República.
Constantes de 1970.
r.

Exterior a/

Productos de Bienes (FOB)

Productos

Productos

Productos de Bienes (FOB)

Productos de consumo

Productos intermedios

Productos y equipos de capital

Productos

Productos

INCOMEX. (Registros).

Composición (2) b/						Tasa Real de Crecimiento Anual (2) b/					
1974	1976	1977	1978	1979 c/		1974	1975	1976	1977	1978	1979
100,0	100,0	100,0	100,0	100,0		6,0	3,8	4,6	-4,9	8,9	5,0
21,1	20,1	21,9	20,4	20,8		32,8	-17,4	25,1	14,0	1,6	7,0
82,0	80,4	80,5	81,9	81,4		4,9	3,3	3,1	5,0	10,7	4,0
11,2	12,3	11,2	13,5	14,7		-6,1	29,8	-8,3	-4,5	30,6	14,0
14,3	12,8	13,6	15,8	16,9		22,6	-9,8	7,9	11,3	26,0	12,0
24,7	24,6	24,0	24,0	23,8		6,2	5,9	2,1	2,5	8,9	3,0
1,4	1,2	1,1	1,0	1,0		-7,0	-5,5	-1,9	-3,9	4,4	-1,0
19,5	19,4	19,3	19,3	19,3		5,6	0,7	7,1	4,1	8,7	5,0
4,9	3,7	3,7	3,5	2,9		3,9	-4,3	-14,2	5,7	2,0	-11,0
7,3	7,8	8,1	8,3	8,4		10,8	7,2	9,0	8,8	11,1	6,0
17,2	17,0	17,1	17,3	17,2		5,0	1,3	6,3	5,5	9,9	4,0
6,4	6,2	6,1	6,0	6,4		2,3	3,8	1,6	3,7	7,1	10,0
18,6	20,1	20,6	20,8	--		--	--	--	--	--	--

(en millones de US\$)						Tasas de Crecimiento Anual					
1975	1976	1977	1978	1979		1975	1976	1977	1978	1979	
1.536,9	1.865,7	2.455,0	3.088,0	3.531,9		2,5	21,4	31,6	25,8	14,4	
680,5	996,0	1.512,6	2.026,8	2.024,9		9,2	42,0	51,8	34,0	--	
81,9	91,0	116,8	59,1	36,9		4,0	11,1	28,3	-49,4	-37,6	
38,8	41,2	57,3	75,5	84,8		40,1	6,2	39,0	31,8	12,3	
103,7	133,4	128,7	--	--		-43,7	28,6	-35,2	--	--	
17,7	23,5	32,2	38,6	43,9		9,3	32,8	37,0	19,8	13,7	
21,0	27,7	35,1	40,8	119,6		-35,4	31,9	26,7	16,2	29,3	
500,7	459,8	408,2	--	--		12,5	-8,7	-11,2	--	--	
1.502,6	1.990,7	2.664,8	3.412,9	4.629,7		-16,0	32,5	33,9	28,0	35,6	
152,0	204,5	3322,6	297,7	379,6		-20,4	34,5	57,7	-7,7	27,5	
723,3	975,0	1.336,4	1.639,5	1.745,4		-27,0	34,8	37,0	22,7	6,4	
611,3	806,2	1.003,7	1.456,9	1.787,1		4,3	31,9	24,4	45,1	22,7	
29,6	154,9	251,1	383,	685,2		335,3	523,3	62,1	52,5	78,8	
16,0	5,0	5,0	18,8	32,4		-20,4	-68,7	--	--	--	

	(en millones de US\$)						Tasas de Crecimiento			
	1974	1975	1976	1977	1978	1979	1974	1975	1976	1977
Mananza de Pagos a/										
Exportaciones (FOB)	1.494	1.747	2.255	2.727	3.275	4.062	18,4	16,9	29,0	20,9
Importaciones (FOB)	-1.510	-1.425	-1.665	-1.979	-2.848	-3.248	53,8	-5,7	17,0	18,8
Servicios (neto)	-390	-450	-419	-339	-385	-343	-4,4	15,3	-6,7	-19,1
Transferencias	55	48	51	46	55	57				
Saldo en cuenta corriente	-351	-80	222	455	97	528				
Préstimo de capitales (neto)										
A largo plazo	251	273	93	209	88	581				
Público	199	249	118	172	77	409				
Privado	35	24	-25	37	11	148				
(Inversión directa)	--	(32)	(14)	(43)	(56)	(124)				
Otros	119	--	--	--	--	24				
A corto plazo c/	-264	-74	224	158	355	136				
Cambios reservas internacionales										
Netas (- aumento)	364	-119	-539	-822	-540	-1.245				
Reservas intern. netas (Bco. Rep.)	429	547	1.166	1.829	2.481	4.106				

fuente: Banco de la República.

Estimación preliminar.

Incluye errores y omisiones.

	En % del PIB								
	Gobierno Central a/						Sector Público b/		
Mananzas Públicas	1971	1974	1976	1977	1978	1979	1972	1974	1976
Ingresos corrientes	9,4	8,0	9,1	8,8	9,4	10,0	19,5	19,9	22,3
Ingresos tributarios	(9,4)	(7,6)	(8,9)	(8,7)	(9,2)	(9,8)	--	--	--
Gastos corrientes	7,7	4,7	6,0	5,8	6,4	(7,1)	15,7	15,4	16,5
Saldo en cuenta corriente	2,7	3,4	3,1	3,1	3,0	2,7	3,9	4,5	5,8
Saldo de capital	3,9	4,2	2,3	2,3	2,3	2,2	7,7	7,9	7,7
Deficit (-) Superávit (+)	-1,2	-0,8	0,8	0,8	0,7	0,5	-3,8	-3,4	-1,9
Financiamiento	1,2	0,8	-0,8	-0,8	-0,7	-0,5	3,8	3,4	1,9
Interno	0,3	0,7	-0,6	-0,6	-0,5	-0,9	1,4	1,5	1,6
Externo	0,9	0,1	-0,2	-0,2	-0,2	0,4	2,4	1,9	0,3

fuente: Banco de la República.

fuente: Departamento Nacional de Planeación.

Banco Nacional a/	1975	1976	1977	1978	1979	Tasa de Crecimiento			
						1975	1976	1977	1978 b/
			(millones de pesos)						
transacciones internacionales netas	1.003	20.135	54.133	82.655	--	--	--	--	--
monetaria	16.418	40.804	69.526	99.274	176.664	47,0	148,5	70,4	35,2
comerciales	-15.415	-20.669	-15.393	-16.619	--	-11,4	-34,1	25,5	-4,9
total	103.287	124.906	160.612	169.170	--	24,0	21,0	28,6	26,5
interno (neto)	11.440	8.594	6.528	4.507	--	20,0	-24,9	-24,0	-37,4
operaciones de fomento	4.663	7.066	11.730	12.167	--	28,4	51,5	66,0	44,2
sector privado	87.184	109.246	142.354	152.496	--	24,3	25,3	30,3	29,2
del Banco de la República	38.763	37.376	56.685	63.101	43.998	16,8	-3,6	51,7	12,4
interno (neto)	9.771	6.363	4.057	-348	-7.356	28,0	-34,9	-36,2	--
comerciales	8.071	7.407	13.934	13.634	13.899	1,1	-8,2	88,1	3,9
operaciones de fomento	18.985	20.641	35.308	46.087	48.208	17,3	8,7	71,0	30,3
sector privado	2.184	2.976	3.659	4.475	6.604	23,3	36,3	22,9	20,6
de pago (oferta monetaria)	58.915	79.383	103.503	134.890	167.637	27,8	34,7	30,4	30,3
del PIB)	14,3	14,9	14,4	15,1	14,4	--	--	--	--
-dinero	31.233	46.374	61.376	84.839	112.795	51,7	48,5	32,4	38,2
del PIB)	7,6	8,7	8,6	9,5	9,7	--	--	--	--

de la República y bancos comerciales.
de crecimiento a diciembre 30.

Banco de la República.

	1974	1975	1976	1977	1978	1979	1980
os (tasa de crecimiento)							
ector del PIB	27,6	20,8	3,6	28,1	--	--	--
sumador (Nivel Bajos Ingresos) a/	26,9	17,9	25,9	29,3	17,8	29,8	26,8 b/
r mayor	36,2	19,6	27,3	19,2	21,6	29,0	--

de diciembre a diciembre de cada año.
lado agosto 1980 a agosto 1979.

Banco de la República.

Pública Externa Pagadera en Divisas	Contratada a Final del Año							
	1970	1973	1974	1975	1976	1977	1978	1979
	(en millones de US\$)							
	1.852	2.736	2.767	3.010	3.361	3.710	4.319	5.419
embolsada	1.250	1.913	2.093	2.348	2.453	2.670	2.803	3.426
desembolsar	602	823	674	662	908	1.040	1.516	1.993
ipo acreedor								
veedores	209	197	211	270	261	249	271	273
cos privados	100	341	300	430	576	594	684	1.317
sión de bonos	21	57	54	52	50	48	45	34
anismos internacionales	716	1.111	1.151	1.193	1.318	1.641	2.054	2.537
Id	(119)	(219)	(280)	(265)	(346)	(398)	(469)	(639)
ierños	782	1.012	1.033	1.050	1.141	1.166	1.256	1.251
os	45	18	15	15	15	12	9	7

Banco Mundial.

		Contratada a Final del Año (%)					
		<u>1970</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
to:	1 a 4 años	24,1	31,0	27,9	29,3	26,1	23,7
	5 a 9 años	22,5	24,4	27,9	27,1	37,9	39,4
	10 años y más	53,4	44,6	44,2	43,6	36,0	36,9
<u>a Deuda</u>		<u>1972</u>	<u>1974</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
total (en millones US\$)		154,0	310,0	278,0	313,0	398,0	664,0
o. de bienes y servicios (%)		12,7	16,7	9,9	9,1	9,7	13,4
<u>el BID</u> Aprobados hasta:		<u>3/79</u>	<u>6/80</u>				
nes de US\$)		1.110,7	1.313,0				
ordinario		424,3	471,5				
interregional		159,5	228,6				
		461,8	547,8				
		49,0	49,0				
ados		16,1	16,1				
%)							
y pesca		13,3	11,5				
al y minería		5,5	7,4				
tes y comunicaciones		18,3	15,5				
		37,1	37,7				
n y ciencia y tecnología		2,5	2,1				
y obras urbanas		10,8	9,1				
		9,5	14,2				
sión		3,0	2,5				

14, 1980
11, 1980
e 30, 1980
bre 11, 1980

I. THE PROJECT

A. Frame of Reference

1. Economic aspects

- 1.01 Recent evolution of the Colombian economy was dominated by unprecedented foreign exchange receipts deriving mainly from higher international prices for coffee. This served to accelerate inflation, forcing the government to make adjustments unfavorably affecting the growth rate of the economy and the process of capital formation. During 1979 there was a decline in economic growth together with a sharper rise in the level of domestic prices. Preliminary data for 1980 would indicate that the economy could not exceed expansion in the previous year and that inflation would decline slightly with a rise in unemployment.
- 1.02 Contrary to the situation in 1978, when the real GDP expanded by 8.9%, ^{1/} the economy during 1979 rose only 5.1%, partly because of restrictive measures adopted by the government in view of the expansive behavior of the external sector. In that process domestic demand was affected basically by the cutback in growth of consumption and of private and public investment.
- 1.03 The stepup in inflation as of 1976 obliged the authorities to adopt a series of monetary, credit and fiscal measures which were able to reduce the growth of monetary supply from 34.7% per annum at the end of 1976 to 24.3% in December 1979. This evolution, together with an increased supply of foodstuffs, cut the annual rate of inflation from 25.9% to 17.8%, calculated as of December 1976 and 1978, respectively. In 1979, however, inflation again took off, recording an annual rate of about 29.8% by year end. The most rapidly rising item was food, because of supply and marketing problems, followed by housing and miscellaneous.
- 1.04 Evolution of economic activity during the first half of 1980 suggests that GDP growth in this year could fall below the rate obtained in 1979. The agricultural sector, following a prolonged summer season, dropped sharply during the six-month period in the production of such articles as rice, sorghum, potatoes and maize, with a smaller recovery than projected for cotton output, while stock raising as a whole appears to have developed normally. Manufacturing activity, except for the upward trend in foods, and construction also failed to reach the level in the preceding year, largely reflecting the less dynamic economy.
- 1.05 Employment continued the downward trend first appearing in the second half of 1979, and by March 1980 open unemployment in the seven major cities came to 10.8%. With regard to oil, production of crude during

^{1/} Between 1975 and 1977 median annual expansion was 4.4%.

the first half was very similar to the same period in 1979, while the value of crude imports dropped 11% and of physical units 35%. Continuation of a realistic policy with regard to prices would also have encouraged exploration by foreign companies, with a number of partnership contracts signed thus far in 1980 to exploit new areas which might contribute to future production increments.

- 1.06 The outlook for the second half of 1980 appears favorable. Credit measures (and a decline in reserves) would favor reactivation of construction and related industries such as brick and cement. Indicators linked to studies by the private sector suggest greater optimism on the part of industrial entrepreneurs. The downward trend in coffee prices deriving from good weather conditions in Brazil would favor reduced pressure on external reserves. Nevertheless, inflation and unemployment are basic factors for concern.

2. Background on sector and loan

- 1.07 The program for development and investment in the energy sector which the Colombian authorities have been promoting takes into account especially the supply of resources from the various sources of energy available to the country within a least-cost maximum-efficiency criterion. More than 50% of proved reserves of the country's energy sources consist of hydroelectric energy, yet the major source supplying the market at present is fuel, despite the downturn in its production.
- 1.08 In view of the foregoing the investment effort in the sector has been concentrated significantly in projects designed for hydroelectric development of the country based on a program to expand the system extensively studied at the national level. Having taken into account the period required for studies and construction of projects for generation of hydraulic energy, the Colombian authorities are now engaged in starting up the expansion program for the interconnected system for 1984-88.
- 1.09 That program, designed to cover demand during the period stipulated, calls for the construction of five hydroelectric plants which would bring installed power capacity, currently 4,050 MW, to 2,966 additional MW upon completion of the total program or 73% of the current level.
- 1.10 One of the hydraulic projects incorporated in this expansion program is Playas, whose projected installed capacity is 200 MW, equivalent to 6.7% of that estimated for the program as a whole and to 5% of current installation. This plant is expected to enter into operation during 1986.
- 1.11 During the programming mission that visited the country from January 28 to February 1, 1980, the Colombian authorities expressed an interest in obtaining an IDB loan to provide partial financing of construction of the Playas hydroelectric plant. The project is part of the Bank's program of prospective loans for 1980.

- 1.12 Having taken into account the amount of financing required, the authorities of Empresas Públicas de Medellín, which would be the borrower and executing agency for the project, contacted the IBRD during the first half of 1980 to secure its collaboration for joint participation with the IDB in financing the project.
- 1.13 Empresas Públicas de Medellín (EEPPM) is an autonomous enterprise owned by the Municipality of Medellín. It was set up in 1955 and is responsible for providing Medellín and adjacent areas with electric energy, water supply and sewerage and telephone services. The EEPPM belongs to the central electric power system and will be interconnected to the national system as of 1982. It currently has an installed capacity of 981 MW (all hydroelectric), equivalent to about 24% of total installed capacity of the electric sector and 34% of the country's hydroelectric installed capacity.
- 1.14 The Bank has not to date granted loans to EEPPM for the energy sector. It has authorized nine loans to that institution in the water and sewerage sector to finance five projects for development of water supply and sewerage, for a total amount of US\$82.6 million. Of those projects three have been completed, one is fully disbursed and in the final stage of execution and the last one, approved in 1979, is being initiated. 1/

B. The Project

- 1.15 The principal aim of the project is to help meet the needs derived from growth of demand in the national interconnected system, as of 1986, as economically as possible within the alternatives available in Colombia.
- 1.16 The project consists of building a 200-MW hydroelectric plant on the Guatapé River, Department of Antioquia, 63 kms east of Medellín and 16 kms upstream from the site of the San Carlos project. It utilizes the flows of the Guatapé River, added to those diverted from the Nare River by the Guatapé and Jaguas projects. At the project site the average flow would be 112 M3/sec., regulated by a fill dam and utilized at the plant following an average gross drop of 175 meters. In addition, two consulting services have been included, one for protection of the Playas dam and the Guatapé basin and the other to study how to minimize economic costs deriving from rationing under the EEPPM subsystem.
- 1.17 The characteristics and dimensions of the major works are shown below:
- a. Reservoir - A rock dam with an impermeable core 65 meters high and a fill volume of approximately 1.86 million cubic meters (over 567,000 cubic meters in the reservoir zone). The reservoir filled

1/ See information on evaluation of these loans in Document PR-971-A.

by the dam would total 85 million cubic meters, of which 47 million would be used to regulate flows of the Guatapé River. The dam will have a depth discharge to prevent operating restrictions at the San Carlos plant situated downstream. To evacuate the maximum crest a free concrete spillway will be built with a discharge capacity of 2,800 cubic meters per second.

- b. Adduction - This includes construction of a concrete-lined load tunnel with a diameter of 6 meters approximately 3,670 meters long. At the lower end of the tunnel a surge tank 230 meters high will be built.
- c. Generating and transforming installations - These consist of a powerhouse located in two underground caverns, one for generating equipment and the other for the transformers, including the following main equipment: i) three Francis turbines with a 67 MW nominal power each for a drop of 175 meters, with spherical valves; ii) three synchronized generators of 76.9 MVA and 13.8 KV each; iii) 10 single-phase transformers; iv) supplementary electromechanical equipment, and v) control and telecommunications equipment. The connection with the booster substation will be provided by 230-KV insulated cables.
- d. Transmission works - To transfer energy to the various consumer centers it will be necessary to build a 230-KV transmission line approximately one km long. The substation will be located on the surface.
- e. Infrastructure - This will cover construction of four kms of highway and a bridge over the Guatapé River, as well as the transmission line to provide energy for construction of works running approximately 14 kms at 13.2 KV, with works expected to begin in February 1981. In addition, 40 kms of highways to replace those to be flooded by the reservoir will be built.

1.18 The consulting services would include:

- a. One consulting service for preparation of a study designed to reduce and protect critical areas, rehabilitate deforested areas and those used for farming and ranching and handle aspects that might affect the health of the local population in both the Playas reservoir and the Guatapé basin.
- b. One consulting service to prepare a study measuring economic costs incurred by EEPFM clients when electric service fails, whether by plan or not. The results will contribute to the drafting of economically efficient rules for planning operation of the system in rationing situations.

C. Borrower and executing agency

1.19 This would be Empresas Públicas de Medellín (EPPM).

D. Guarantor

1.20 This would be the Republic of Colombia.

II. COST AND FINANCING

A. Project Cost

2.01 The total cost of the project has been estimated at the equivalent of US\$362.3 million; its distribution by basic investment category and source of financing would be as follows:

^{1/} Section C of Chapter IV on project execution shows the status of progress and the schedule for final plans and designs of the project.

TABLE COSTS AND FINANCING
(In Millions of US\$ or Equivalent)

	<u>IDB</u>	<u>IBRD</u>	<u>SUPPLIERS</u>	<u>EEPPM</u>	<u>Commercial banks and or ClC</u>	<u>TOTAL</u>
<u>Engineering and Management</u>	<u>0.30</u>	<u>7.00</u>	<u>-</u>	<u>14.04</u>	<u>-</u>	<u>21.34</u>
Engineering and Supervision	0.30	7.00	-	9.56	-	16.86
Management	-	-	-	4.48	-	4.48
<u>Direct Costs</u>	<u>42.32</u>	<u>45.63</u>	<u>13.04</u>	<u>70.48</u>	<u>3.89</u>	<u>175.36</u>
Access Roads	-	-	-	0.91	-	0.91
Access Tunnel to Power Plants	2.10	-	-	1.65	-	3.75
Workers Campsite	-	-	-	8.27	1.59	9.86
River Diversion	-	14.80	-	13.42	-	28.22
Dam and Spillway	-	20.12	-	15.25	-	35.37
Underground Excavation Work	40.22	-	-	29.15	-	69.37
Turbines	-	-	5.54	-	0.98	6.52
Generators	-	-	7.50	-	1.32	8.82
Supplementary Elect. Equip.	-	6.45	-	0.58	-	7.03
Mechanical Equipment	-	4.26	-	1.25	-	5.51
<u>Associated Expenses</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>4.80</u>	<u>-</u>	<u>4.80</u>
Land purchased	-	-	-	4.50	-	4.50
Consulting work	-	-	-	0.30	-	0.30
<u>Finance charges</u>	<u>18.00</u>	<u>-</u>	<u>-</u>	<u>7.99</u>	<u>24.88</u>	<u>50.87</u>
Interest	17.15	-	-	7.99	20.83	45.97
Credit fee	-	-	-	-	4.05	4.05
Insp. and Superv. fund	0.85	-	-	-	-	0.85
<u>Allocable Expenses</u>	<u>24.38</u>	<u>32.37</u>	<u>7.96</u>	<u>42.84</u>	<u>2.38</u>	<u>109.93</u>
Contingencies	6.84	8.31	2.02	10.16	0.61	27.94
Escalation	<u>17.54</u>	<u>24.06</u>	<u>5.94</u>	<u>32.68</u>	<u>1.77</u>	<u>81.99</u>
TOTAL	85.00	85.00	21.00	140.15	31.15	362.30
Percentage	23.5	23.5	5.8	38.7	8.5	

B. Cost Calculation Basis

- 2.02 The estimate of project costs was prepared jointly by the EEPPM and the consulting company responsible for preparing bidding designs and specifications (SEDIC Ltda.), based on estimated prices for December 1979 in accordance with following data: i) completed feasibility studies; ii) preliminary designs supporting the feasibility studies; iii) detailed designs which, at the time of cost review by the analysis mission, were 20% complete, and iv) knowhow and experience in the zone for nearby and similar works.
- 2.03 Progress on the studies serves to identify, in the case of civil works, the major items comprising each work and the volumes of work involved. In nearby zones three plants were under construction, San Carlos I and II and Jaguas, and recently, at the end of 1979, construction of the Guatapé plant was completed. Experience and knowhow acquired during execution of those works has provided valuable support with reference to both knowledge of geology in the area of the installation and its design and cost estimate. The Bank, in order to confirm the major technical aspects of the project, contracted in September of this year the expert W. T. Swiger to evaluate general geological conditions of the project, giving an opinion on the comparability of the design and the geology and on volume and principal unit costs. This expert confirmed in his report the soundness of the design and the adequate estimate of volume and of unit costs. The unit costs resulting from similar works currently in progress and those estimated for other works for which the feasibility and design phase has already completed also served as a guide for establishing unit costs, which were considered satisfactory upon review by the Bank.
- 2.04 The costs of the principal electric and mechanical equipment, including controls and protection systems, were estimated on the basis of recent information from manufacturers for similar equipment in such other projects as Betania, San Carlos and Guadalupe IV. The cost of assembling the equipment was estimated at 12% of the FOB cost thereof.
- 2.05 The category of engineering and administration includes: i) costs corresponding to the contract entered into by the EEPPM with the consulting firm SEDIC for engineering, design, bidding documents and advisory services on control, with an approximate value of US\$5 million; ii) the cost of the control contract, estimated at approximately 6.5% of direct costs (US\$11.56 million), a reasonable percentage for the extensive work to be carried out by the supervisory firms since the executing unit to be set up for project development will be small; iii) the cost of contracts of consultants forming the board of consultants to advise the firm responsible for supervision of works on specialized matters. That board would consist of not more than three consultants highly specialized in aspects of geology (especially tunnels), construction of dams and spillways and hydrology it is estimated that each consultant would make three 10-days visits each a year with an approximate cost of

US\$6,000 per visit, amounting for three consultants to about US\$300,000; iv) administrative costs, estimated at 2.5%, also based on the scheme of the projected executing unit, aggregating US\$4.48 million.

- 2.06 The associated costs are divided into two portions: i) the cost of acquiring land, for an amount of US\$4.5 million, a figure estimated on the basis of a cost of US\$3,200/hectare for a total of 1,400 hectares, and ii) the cost of contracting the study for protection of the Playas reservoir and the Guatapé basin, estimated at approximately US\$250,000 and those for preparation of the study to minimize the cost of rationing, which would also amount to about US\$15,000, to be financed in both cases fully by the EEPPM.
- 2.07 The unspecified costs include: i) contingencies, with the percentage estimated at 16% of direct costs, based on the nature of the project and progress made on the design as of the end of December 1980 (35%); for civil works, the percentage was estimated at 15% and for equipment 20% was envisaged with a national portion of 15% for the imported portions; ii) escalation, for which the World Bank method was employed, based on projected rates of external and internal inflation and devaluation. This method has been utilized before by the IBRD in earlier loans to the EEPPM. Consequently, it was also approved on this occasion by the borrower.

C. Project Financing and Use of Resources

- 2.08 As indicated in the previous table, in addition to the borrower and the IDB, the World Bank, suppliers and commercial banks would participate in project financing, possibly through a complementary line of credit (CLC), a matter now under study by the EEPPM. The latter plans to inform the Bank of its decision during 1981, in which year, according to projected resource requirements, those resources will have to be contracted. The decision would be reached far enough in advance to allow for implementing an operation of this type (CLC).
- 2.09 The financing with IDB and IBRD resources would amount to US\$170 million, divided into like amounts of approximately US\$85 million for each institution. The division of that amount between the two institutions was based on feasible bidding packages, so that each institution will finance packages of individual works, and on the bidding schedule. In accordance with that division the IDB would finance part of the plant access tunnel and underground works and the IBRD part of the contract for the diversion tunnel and the dam and spillway, in every case including the corresponding contingencies and escalation.
- 2.10 The suppliers would finance part of the cost (85%) of the major equipment, and the IBRD part of the cost for auxiliary equipment which are not usually financed by suppliers, with contingencies and escalation included in both cases. The resources of the commercial banks (and/or CLC) would finance interests for the IBRD (the IDB would finance its

own) and suppliers, the commitment fee and the down payment (15%) for major equipment together with contingency and escalation and part of the cost of the camp infrastructure. The EEPMP, through generation of its own funds, would finance part of direct costs, acquisition of land for construction purposes and the reservoir, the two advisory services planned, part of the total cost of interest and contingency and escalation corresponding to the direct costs it finances.

- 2.11 In analyzing the proposed operation the Bank has maintained continuing contact with the IBRD in order to coordinate actions relating to consideration of the loan application, including the analysis mission, which was conducted jointly. Taking into account the IBRD loan program, it is estimated that approval of this financing by that institution would be secured at the beginning of the second quarter of 1981. However, since the procedures for processing applications up until signature of the loan contract are different in the case of the IBD and of the IBRD, in as much as the procedures involved subsequent to approval entail different time limits up until the financing is declared eligible for disbursement, it is considered timely to present now to the Bank Board of Executive Directors for consideration this loan proposal in order to ensure that the respective financing operations are available for disbursement simultaneously in the second half of 1981 and can cover the resource requirements deriving from the two facilities to be bid on in advance, the access and diversion tunnels. In view of the five-year construction term required, the plant would thus be able to enter into operation in 1986 as scheduled in the expansion program, contributing to attainment of the program goals.
- 2.12 In order to ensure the participation of both financing operations, it is recommended that the proposed resolution include a clause making eligibility for initial disbursement from the IDB loan contingent upon formal approval of the IBRD loan (see proposed resolution).
- 2.13 The Bank financing, all in foreign exchange, would be drawn entirely from the inter-regional capital resources of the IDB. This foreign exchange financing represents 23.5% of total project costs, below the 40% agreed on for Columbia in projects of this type as indicated in Document FP-33-1. Nevertheless, this amount and percentage of financing is recommended in view of the fact that another international credit institution is participating, with financing provided by both agencies amounting to 47%.

D. Finance Conditions

- 2.14 The IDB financing conditions would be as follows: i) interest: 8-1/4%; ii) credit commission: 1-1/4% per annum; iii) grace period: five years; iv) amortization period: 20 years, including the grace period; v) disbursement term: five years.

III. PROJECT EXECUTION

A. Institutional Aspects

- 3.01 Empresas Públicas de Medellín would be responsible for execution of the project with regard to all technical, administrative, financial and accounting aspects, through an executing unit to be set up for purposes of coordination, administration and supervision of the project and with the advisory services of consultants especially contracted for the purpose.
- 3.02 The principal characteristics of the executing unit have been agreed on by the EEPPM, and both its organizational scheme and description of functions have been reviewed by the Bank and deemed adequate. No difficulties are expected in having that institution demonstrate, to the satisfaction of the Bank prior to the first loan disbursement, that the unit has been formed and begun operation (see proposed resolution). The various units of the EEPPM would provide administrative and accounting support to the executing unit and for such other services as might be required in order to reduce unit staff to a minimum and avoid duplication of functions performed by the other units. The minimum personnel manning the unit would be: i) one director, answerable to the technical manager; ii) one engineer for the work front, and iii) technical and administrative support personnel.

B. Technical Aspects

- 3.03 Consulting services for supervision of works to be financed in part with IBRD resources would be contracted by procedures for selection of consultants and consulting firms acceptable to the Bank. To that end it is planned to contract a consulting firm, which would require a single contract. That firm should be contracted prior to the first disbursement from the loan (see proposed resolution).
- 3.04 For the contracting of individual consultants to form a board of consultants, a practice being employed with good results in similar projects in Columbia, three contracts are planned, consistent with the number of consultants who would participate. The EEPPM would sign, to the satisfaction of the Bank, within a period of not more than one year from signature of the contract for the prospective financing, service contracts with the three high-level experts in order to ensure that those consultants will be available as of a certain point in progress on the project when their services would be required (see recommendations).
- 3.05 The consulting services for a study to protect the Playas reservoir and the Guatapé basin would be contracted within a period of not more than one year from the date of the contract, according to terms of reference acceptable to the Bank (see Recommendations). The consulting services

to examine economic costs of rationing electric energy from the borrower's system would also be contracted within one year from the date of the loan contract, in accordance with terms of reference acceptable to the Bank. However, at the borrower's request, this obligation was established in a letter of commitment duly sent by the latter to the Bank.

- 3.06 Implementation of the final designs and preparation of the bidding specifications were contracted, following a competition based on qualifications, with the firm of engineering consultants SEDIC Ltda. in February 1979. According to the corresponding terms of reference, the study included: a) review of existing information and of preliminary designs done in earlier stages, together with geological and hydrological research; b) study of project alternatives; c) preparation of final designs and specifications for bidding on the various parts of the project and preparation of the detailed plans for construction of works, together with advisory services on study and award of bidding, and d) technical advisory services of the consulting firm to supervise the project. To date the consulting firm has reviewed existing information and preliminary designs, as well as the study of alternatives, and has defined the principal characteristics of the works, estimating that the status of progress on execution of the final designs would amount to 35% by the end of December 1980. Although preparation of the final designs and bidding documents has not yet been completed, the experience acquired from projects in operation and construction in very nearby zones with geological features similar to this project suggest that, with the information available provided by the preliminary designs at the feasibility study level and the status of current progress, bases are adequate for estimating that the schedule for execution of designs will not be changed. This means that the work could be initiated within the terms proposed and that the estimates of costs and volume of work, as well as the program for project execution, are adequate. All of the preceding has been confirmed, as noted earlier, by the engineer contracted by the Bank to give an opinion in that regard.
- 3.07 It is believed that the period for project execution will be five years, within which it is planned to undertake bids, contracting, procurement and assembly of equipment and construction of works for the project. The tentative disbursement calendar for both the resources of the Bank loan, and the IBRD, suppliers and commercial banks (and/or CLC) and the local contribution has been estimated on the basis of the preliminary execution plan for the project.
- 3.08 The civil works would be awarded by means of nine separate contracts, including four main ones, through international bids as follows: i) dam and related works; ii) subterranean works; iii) access tunnel, and iv) river diversion and catchment; the remaining five, ordered through national bidding, would be: v) access ways; vi) replacement roads (replacing ones affected by the construction); vii) camp; viii) distribution line for construction, and ix) transmission line. The major equipment, in turn, is expected to be awarded through international bidding

in two separate contracts according to their nature: a) turbines, and b) generators. The auxiliary electromechanical equipment, also to be bid on internationally, would be awarded in 12 smaller contracts.

- 3.09 The following would be the schedule for the major bidding, which as a whole is equivalent to 87% of the direct total cost:

<u>International Bidding</u>							
<u>Lic. No.</u>	<u>Description</u>	<u>Dates of</u>				<u>Amount</u>	<u>Financ- ing</u>
		<u>Convo- cation</u>	<u>Award</u>	<u>Start of Works</u>	<u>Comple- tion</u>		
OC-02	Access and auxil- iary tunnel	Feb/81	Aug/81	Sept/81	Aug/82	3.75	IDB
OC-03	Diversion and catchment	May/81	Nov/81	Dec/81	Oct/83	28.22	IBRD
	Dam and spillway	Oct/81	Aug/82	Sept/82	Apr/86	35.37	IBRD
	Subterranean works (conduction tunnel, power house and discharge tunnel)	Oct/81	July/82	Aug/82	Dec/85	69.37	IDB
EE-01	Turbines	May/81	Mar/82	Mar/84 <u>2/</u>	Oct/86	6.52	Supplie
EE-02	Generators	May/81	Mar/82	Mar/84 <u>2/</u>	Oct/86	8.82	Suppliers

- 3.10 Materials for the dam will be obtained primarily from the spillway excavation. Aggregates for the concrete may be obtained from the beaches or from the crushing and classification of materials from excavation of tunnels. Sand will be obtained partly from some of the beaches upstream and downstream from the project, supplemented by the product of crushed material from tunnel excavation. The filters will be built with material from the rock excavation or with sand and gravel from certain beaches. The rock-fill material will be obtained partly from the rock excavation for the spillway and some a quarry now being worked for construction of the San Carlos project downstream from this project. According to observations made during the visit of the analysis mission, no difficulties are expected because of lack of cement, reinforcing steel, wood or other materials necessary for construction.

- 3.11 Operation and maintenance (preventive and corrective) of the project will be the responsibility of the EEPPM, through the Energy Production Division, a unit of the Office of the Operations Manager, which will be responsible for maintaining all EEPPM energy transmission and generating installations.

1/ Direct cost in US\$ millions.

2/ Assembly starting date.

- 3.12 In order to establish a demarcation of the land to be affected by the project, work was based on aerophotogrammetric maps in order to locate the reservoir level, dam site, power house, routing of new project access highways and protection zone, resulting in an area encompassing approximately 1,400 ha. To date the EEPPM is negotiating with ISA to transfer 250 ha forming part of the reservoir and has begun negotiations for a similar area corresponding to the construction zone. In the area to be acquired are located about 100 plots that are not used for major crops or occupied by owners deriving their main income from working of the land affected. The EEPPM policy in this respect is to negotiate directly with owners. In the event no agreement should be reached, the land would be expropriated, for which purpose a flexible procedure is available that requires prior declaration of public utility of the respective lands, a matter which the EEPPM is already attending to in order to obtain the total area involved in the project. With regard to the possible relocation of families inhabiting the area, estimated at not more than 50 and distributed over a very scattered area, the EEPPM has indicated its intention of indemnifying them without considering relocation. To ensure timely progress on action designed to acquire the lands it is recommended that, prior to the first disbursement, the EEPPM present to the Bank a report on the number of persons to be displaced, how they should be compensated and the plan and schedule for displacement and for procurement of the land (see proposed resolution).
- 3.13 It is recommended that costs incurred by the EEPPM in the project before approval of the loan contract but after August 4, 1980, the date on which the borrower delivered to the Bank support documentation for the loan application, be recognized as part of the local counterpart. The date of delivery would have corresponded to the date of formal application in the event there had been national authorization for external indebtedness, which was not obtained until November of this year (see recommendation). These investments are estimated at the equivalent of US\$2.0 million and correspond to costs of studies, engineering designs and infrastructure work completed. It is not expected that any cost will be incurred before approval of the loan eligible for financing with resources from the prospective IDB credit.

IV. PROJECT JUSTIFICATION AND FEASIBILITY

A. Technical Feasibility

- 4.01 The technical analysis indicates that the project has been well conceived, and no major difficulties are expected during its execution. It can be concluded, based on the current status of designs, that definition of the project and its cost has provided adequate coverage for contingencies, especially considering that unit prices have been reviewed in the light of recent quotations received for similar projects in Columbia. The terms for project execution were established by mutual agreement between SEDIC and the EEPPM and verified by the analysis mission through development of the project execution plan (PEP), in which

realistic terms were established for the various activities necessary to attain project goals.

- 4.02 The above considerations make it possible to conclude that the project has a sound technical conception, its designs have been carefully prepared to ensure an adequate and safe construction, costs have been recently confirmed and the execution term is reasonable, making it technically feasible. The international expert F. Swiger contracted by the IDB has reaffirmed in his reports the soundness of the feasibility study and the current design, in general terms, based mainly on the hypothesis that the geology of the Playas installation is similar to that of the Guatapé, Jaguas and San Carlos hydroelectric plants located a few kilometers away from Playas. Likewise Mr. Swiger's comments by on unit costs confirm observations made during the visit of the analysis mission.

B. Financial Feasibility

- 4.03 The financial results of the EEPPM as a whole and those of the energy sector have been satisfactory in the years analyzed, demonstrating a sound financial administration which is expected to continue in the future. Taking into account financial projections, it is believed that the EEPPM would have the necessary funds to make local counterpart contributions to the project and to underwrite other construction and expansion programs.
- 4.04 The table on source and use of funds shows that the surplus of funds projected up to 1985 is rather tight, which is understandable considering the financial effort required by the Playas and Guadalupe IV projects. Therefore, it is considered prudent to recommend that the loan contract include a clause whereby the EEPPM would agree not to make, during execution of the project, investments other than those corresponding to the two projects mentioned, as well as those it would make as an equal shareholder, for an amount which as a whole would exceed annually the equivalent of US\$20 million (see proposed resolution). The amount mentioned is based on the enterprise investment program plus projected availability of funds.
- 4.05 Coverage of debt service during the period projected is more than double, which is considered satisfactory. For purposes of maintaining a suitable financial policy it is recommended that the loan contract include a clause whereby the EEPPM would agree not to assume any new long-term debts, in the energy sector and throughout the life of the loan contract, if coverage of that projected debt service should be less than double (see proposed resolution and Appendix 3 hereto).
- 4.06 The rate of return required to obtain an actual breakeven point peaks at 13.1% in 1983, coinciding with the fact that the largest disbursements have been scheduled in that year in order to cover the Guadalupe IV and Playas projects. In order to determine the rate of return for the rate clause and considering that there will always be a possibility that the

works will fall behind schedule, reducing cash requirements, it is considered appropriate to set the rate of return at not less than 9% per annum, based on the average rate of return for 1981-86. The year 1981 is excepted, since all indications are that the return in that year will be 8%, according to projections (see Appendix 3 to this loan proposal). If the rates noted should not be sufficient to cover cash requirements, the borrower would be obliged to adopt such measures as might be necessary to secure the additional resources needed (see proposed resolution).

C. Economic Feasibility

- 4.07 The economic feasibility of the project was based on examination of the least-cost expansion program of the Colombian electric system and quantification of energy supply benefits produced by the project. For analysis of the 1984-88 generating program alternative projects were studied by adding them to the system one by one using the preordering system. The Playas project is part of that program and is scheduled on stream in 1986.
- 4.08 System simulation indicates that project benefits derive from savings in fuel and operating and maintenance costs. Fuel savings are produced by estimating the additional generating costs that would be needed to substitute energy originating in the Playas project for thermal energy produced at any of the existing plants. Savings and operating maintenance costs occur by replacing thermal generation, which costs US\$7 per KW installed, with a hydraulic source, costing only US\$2 per KW installed. Savings on operating and maintenance costs would be equal to the difference in cost per KW installed (US\$5) multiplied by the KW installed at Playas (200,000 KW), that is, US\$1 million a year. It is expected that the savings will materialize because, even if the thermal plants should continue to operate, their operating and maintenance costs will be reduced.
- 4.09 The internal rate of return is from 12.7% to 16.5%, depending on the demand projection used. An additional calculation has been made of net benefit from postponing the investment for one year. The result indicates that, although the reliability of the system does not change, the cost of postponing entry into operation of the project is US\$5 million higher than the benefit of deferring the investment by one year.
- 4.10 With regard to distribution of benefits it can be said that: i) project benefits from fuel savings accrue entirely to the central government; ii) the small savings in operation maintenance would be retained by the public enterprises, which would reduce their operations, and iii) there would be some benefits from higher income for unskilled labor corresponding to a little less than 2% of direct investment cost and even 5.5% of net benefits. The amount of the loan attributable to low-income groups, according to the above percentage, would be US\$4.7 million equivalent.

V. SPECIAL ASPECTS

- 5.01 Recognition as part of the local counterpart is recommended for costs incurred by the EEPPM in the project before approval of the prospective loan contract, that is, from the date on which the EEPPM presented for Bank consideration the support documentation for the loan application, corresponding to the date on which the institution would have formally presented the application if national authorization which was only approved recently in November had been available for external indebtedness.

PROPOSED RESOLUTION

COLOMBIA. LOAN /IC-CO TO EMPRESAS PUBLICAS DE MEDELLIN
(Playas Hydroelectric Plant)

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 Empresas Públicas de Medellín, of Colombia, as borrower, and the Republic of Colombia, as guarantor, for the purpose of granting the former financing to cooperate in the execution of a project consisting in the construction of the Playas hydroelectric plant. This financing shall be subject substantially to the following conditions:

1. Amount and Currencies: Up to US\$85,000,000 or the equivalent in other currencies which are part of the inter-regional capital resources of the Bank, 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. Payments of amortization and interest shall be made in the currencies disbursed.
2. Source of Funds: The inter-regional capital resources of the Bank.
3. Guarantee: Joint and several guarantee of the Republic of Colombia.
4. Credit Fee: 1-1/4% per annum on the undisbursed portion of the financing, commencing to accrue 60 days after the date of the contract and 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 20 years from the date of the contract, by means of semiannual, consecutive and, insofar as possible, equal installments. The first installment shall be paid six months after the date established for the last disbursement of the financing.
6. Interest: 8.25% per annum, payable semiannually on principal amounts outstanding. 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 for paying the interest during the disbursement period.

7. Disbursement: The period for disbursement of the financing shall expire five years after the effective date of the contract.

8. Special Conditions:

- (a) The resources of the loan shall be utilized in their entirety by the borrower, through the Project Executing Unit. If legal modifications or modifications in the basic regulations concerning the borrower 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\$362,300,000. Consequently, the loan and guarantee contracts shall contain appropriate provisions to ensure that such resources as may be required, in addition to the loan, for the complete execution of the project will be duly provided, in accordance with a schedule of investments satisfactory to the Bank, in a total amount estimated at the equivalent of US\$277,300,000, which shall include: (i) the local counterpart contribution to be made by the borrower, which is estimated at the equivalent of US\$140,150,000; (ii) a loan from the International Bank for Reconstruction and Development (IBRD) which is estimated at the equivalent of US\$85,000,000, and (iii) suppliers' credits and commercial bank financing.
- (c) Prior to the first disbursement of the financing, the borrower shall present the following to the Bank's satisfaction:
 - (i) proof that the IBRD has approved the financing to which reference is made in item (b)(ii) above;
 - (ii) evidence that the Project Executing Unit is organized and in operation and has sufficient qualified staff and the necessary means for carrying out the project;
 - (iii) evidence that the borrower has contracted for the services of a consulting firm to advise it in the supervision and execution of the project, in accordance with terms of reference and procedures acceptable to the Bank;
 - (iv) a report on the number of persons who will be dislodged as a result of the project works, the manner in which they will be compensated and/or relocated, and the plan and schedule

for dislodging them and for acquisition of the land to be utilized for the project.

- (d) The borrower and the guarantor shall take appropriate measures, acceptable to the parties herein, in order that the borrower's rates for the supply of electric energy: (i) produce revenues at least sufficient to cover all the operating expenses of the system, including those related to administration, operation, maintenance and depreciation; and (ii) yield a reasonable rate of return on the net revalued utility investment in the system. If application of the foregoing does not generate sufficient revenues to cover the timely servicing of all of the borrower's obligations, the borrower and the guarantor shall take such measures as necessary to obtain the additional resources required for achieving that purpose.
- (e) During the period of execution of the project, the borrower shall not, without the prior authorization of the Bank, make investments in its energy department, other than those pertaining to the present project, those for the "Guadalupe IV" project and those it is called upon to make as a shareholder of Interconexión Eléctrica S.A. (ISA) which, in the aggregate, exceed the equivalent of US\$20,000,000 in given year.
- (f) During the life of the loan contract, the borrower shall not, without the prior authorization of the Guarantor and the Bank, incur new debts for the borrower's energy department with maturities exceeding one year if as a result its annual ratio for the energy sector between (i) the internal generation of funds, and (ii) the total amount for debt service is not in accordance with paragraph 7.01 of Appendix 3 (Annex A of the loan contract).
- (g) The borrower and the guarantor shall undertake in the respective contracts with the Bank to extend to the Bank any other obligation or security relating to the execution of the project that they may agree with any other international financial agency that provides financing for this project.
- (h) 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 contract 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.
- (i) The Bank shall establish such inspection procedures as it deems necessary to ensure 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\$850,000 shall be allocated for a credit to the accounts of the Bank to meet expenses of general inspection and supervision.

RECOMMENDATIONS

- A. It is recommended that the following conditions, to be fulfilled to the Bank's satisfaction, be included in the loan and/or guarantee contract, as appropriate, in addition to the conditions set forth in the proposed resolution:
1. Unless the Bank shall otherwise agree, prior to issuing each call for public bids, the borrower shall present to the Bank:
 - (a) the general plans, specifications, budgets, specific bidding requirements, and any other documents necessary for the call; and
 - (b) in the case of construction, evidence that it has legal possession or the necessary rights over the lands where the project works will be built, and that it enjoys the right to use the water required for the project.
 2. The borrower shall undertake to contract, in accordance with terms of reference and procedures acceptable to the Bank, within a period of one year from the effective date of the loan contract:
 - (a) an expert or consulting firm to perform a study on pollution, which takes place up-river of the plant, which shall include recommendations for control of such pollution and the pertinent implementation schedule, and
 - (b) the services of high-level experts on design and construction of hydroelectric works to advise the borrower, over such time as necessary within the project execution period, on special technical aspects of the project.
 3. The borrower undertakes to present to the Bank, during the year preceding the entry into operation of the hydroelectric plant financed under this project, a plan for implementing the recommendations of the study being performed on the economic optimal dispatch of the national interconnected system.
 4. The Borrower shall present to the Bank at the end of the first quarter of each calendar year, beginning in 1985 and continuing over the next 10 years, a report on the maintenance of the project works, indicating the work done during the previous year, the amount of funds assigned to such work, the results achieved, and the programs for the following year.

5. The Bank may recognize as part of the local contribution to the project, expenditures under the headings of engineering and administration, up to the equivalent of US\$2,000,000, which have been made before the date of the resolution but after August 4, 1980, provided that requirements substantially similar to those set forth in the resolution and in the loan contract have been fulfilled.
 6. The financial statements of the borrower, during the life of the contract, and those of the project, during its execution, shall be submitted annually to the Bank audited by an independent firm of public accountants acceptable to the Bank. The first statements shall be those pertaining to the year in which execution of the project begins.
- B. An annex substantially similar to Appendix 3 (The Project) shall be included in the loan contract.

THE PROJECT
(Annex A to the Loan Contract)

I. Purpose

- 1.01 The basic purpose of the Project is to increase the Colombian electric system's installed generating capacity by 200 MW and its production of energy by approximately 1,452 GWH.

II. Description

- 2.01 The Project shall consist of:

- (a) the execution of the following works: (i) a waterproof-core rock-fill dam at the site known as "Playas", with its corresponding intake structures, diversion works and spillway; (ii) a headrace consisting of a tunnel approximately 4 kilometers long, a surge tank and penstock; (iii) generation and transformation works consisting of a powerhouse lodged in two caverns, one for the generation equipment and the other for the transformers; (iv) transmission facilities consisting of a transmission line of approximately 1.5 kilometers long from the substation to the existing line, and (v) infrastructure works consisting in the construction of substitute access highways and a transmission line for the works of the project.
- (b) The contracting of consulting services referred to in Recommendation A.2(a).

III. Project Cost

- 3.01 The total cost of the Project is estimated at the equivalent of US\$362,300,000, itemized approximately as shown in the following table:

TABLE OF COSTS AND FINANCING
(in US\$ millions equivalent)

	BANK	BIRF	SUP- PLIERS	BOR- ROWER	COMMERCIAL BANKS and/or CLC	TOTAL	%
1. <u>Engineering and Administration</u>	<u>0,30</u>	<u>7,00</u>	<u>-</u>	<u>14,04</u>	<u>-</u>	<u>21,34</u>	<u>5.9</u>
1.1 Engineering and supervision	0,30	7,00	-	9,56	-	16,86	
1.2 Administration	-	-	-	4,48	-	4,48	
2. <u>Direct Costs</u>	<u>42,32</u>	<u>45,63</u>	<u>13,04</u>	<u>70,48</u>	<u>3,89</u>	<u>175,36</u>	<u>48.4</u>
2.1 Access roads	-	-	-	0,91	-	0,91	
2.2 Plant access tunnel	2,10	-	-	1,65	-	3,75	
2.3 Camp	-	-	-	8,27	1,59	9,86	
2.4 Diversion of the river	-	14,80	-	13,42	-	28,22	
2.5 Dam and spillway	-	20,12	-	15,25	-	35,37	
2.6 Underground works	40,22	-	-	29,15	-	69,37	
2.7 Turbines	-	-	5,54	-	0,98	6,52	
2.8 Generators	-	-	7,50	-	1,32	8,82	
2.9 Complementary electrical equipment	-	6,45	-	0,58	-	7,03	
2.10 Mechanical equipment	-	4,26	-	1,25	-	5,51	
3. <u>Concurrent Costs</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>4,80</u>	<u>-</u>	<u>4,80</u>	<u>1.3</u>
3.1 Purchase of land	-	-	-	4,50	-	4,50	
3.2 Consulting services	-	-	-	0,30	-	0,30	
4. <u>Financial Costs</u>	<u>18,00</u>	<u>-</u>	<u>-</u>	<u>7,99</u>	<u>24,88</u>	<u>50,87</u>	<u>14.0</u>
4.1 Interest	17,15	-	-	7,99	20,83	45,97	
4.2 Credit Comision	-	-	-	-	4,05	4,05	
4.3 Bank inspection and supervision charge	0,85	-	-	-	-	0,85	
5. <u>Unallocated Costs</u>	<u>24,38</u>	<u>32,37</u>	<u>7,96</u>	<u>42,84</u>	<u>2,38</u>	<u>109,93</u>	<u>30.4</u>
5.1 Contingencies	6,84	8,31	2,02	10,16	0,61	27,94	
5.2 Escalation	17,54	24,06	5,94	32,68	1,77	81,99	
TOTAL	85,00 =====	85,00 =====	21,00 =====	140,15 =====	31,15 =====	362,30 =====	100.0 =====
Percentages	23.5	23.5	5.8	38.7	8.5	100.0	

IV. Bidding

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

V. Selection and Contracting of Consulting Services

- 5.01 In the selection and contracting of consulting services to be financed in whole or in part with funds from the financing, no conditions or stipulations shall be imposed that would restrict or preclude the participation of consulting firm or consultants from members countries of the Bank.

VI. Rate of Return

- 6.01 By virtue of the provisions in paragraph 8(d)(ii) of the resolution, the rate of return on net revalued utility investment shall be at least 8% per annum in 1981 and at least 9% per annum in the subsequent years. The rate of return shall be calculated for each calendar year using the methodology specified in Appendix 4 to this loan proposal.

VII. Debt Limitation

- 7.01 The ratio referred to in clause 8(f) of the resolution, shall be acceptable to the Bank, but in no case lower than that which the borrower agrees upon with the World Bank.

Methodology for Calculating the Rate of Return

1. The rate of return indicated in paragraph VI of Appendix 3 shall be calculated annually at the close of the fiscal year beginning with the year ending December 31, 1981 and continuing throughout the life of the loan. The net operating revenue of the electric energy sector of EE.PP.M shall be used as the numerator, and the average of the net utility investment in that sector at the start and at the end of the same fiscal year shall be the denominator.
2. Any excess or shortfall in the rate of return obtained at the end of a fiscal year will be carried over to the following year in such a way as to reduce or increase, as the case may be, the numerator of the ratio used for establishing the target for the following fiscal year.
3. The "Net Operating Revenue" shall be determined by subtracting from the total operating revenue of the electric energy sector all the operating costs of that sector, including those for administration, operation, maintenance, taxes (except those on utilities) and depreciation.
4. The "Net Utility Investment" of the company in the electric sector shall be the Gross Fixed Assets in Service less the cumulative depreciation, revalued and depreciated as specified in paragraphs 5 and 6 below, plus the working capital related to the electric energy business, which shall be estimated at 2/12 of the operating revenue obtained in the electric business of EE.PP.M. during the year in question.
5. Until another method is established for updating the value of the assets of the company, the gross fixed assets in service and works in progress shall be updated on the basis of the National Consumer Price Index - Level 1 - published by the Departamento Administrativo Nacional de Estadística de Colombia at the close of the corresponding year.
6. The depreciation of the revalued assets shall be charged according to the straight line method, applied to the useful life of the corresponding assets.
7. In calculating the Net Revalued Utility Investment during the period specified in paragraph 1, the values as of December 31, 1976, shall be taken as the initial values. These values are:
 - (a) Eight billion forty four million Colombian pesos (Col\$8,044,000,000) for gross fixed assets in service.
 - (b) One billion seven hundred seventy-nine million Colombian pesos (Col\$1,779,000,000) for cumulative depreciation.
 - (c) Three billion one hundred forty-eight million Colombian pesos (Col\$3,148,000,000) for works in progress.

8. The borrower shall present to the Bank each year a brief report indicating the manner in which the values determining the rate of return achieved have been calculated. This report shall be presented within and during the period established for presenting its financial statements.