DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

CHILE

RURAL ELECTRIFICATION PROGRAM

(CH-0174)

LOAN PROPOSAL

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BASIC SOCIOECONOMIC DATA

For basic socioeconomic data, including public debt information, please refer to the following address:

http://www.iadb.org/RES/index.cfm?fuseaction=externallinks.countrydata

ABBREVIATIONS

BIP	Integrated Public Investment Projects Bank
CASEN	National Socio-economic Survey
CNE	National Energy Commission
CONAMA	National Environment Commission
DIPRES	Budget Office of the Ministry of Finance
DVA	Distribution value added
EIAS	Environmental impact assessment system
EIRR	Economic internal rate of return
EMP	Environmental management plan
FNDR	National Regional Development Fund [Fondo Nacional de Desarrollo Regional]
FNDR-ER	National Regional Development Fund – Rural Electrification [Fondo Nacional de Desarrollo Regional – Electrificación Rural]
GEF	Global Environment Facility
GWh	Electric power in gigawatts-hour
ICB	International competitive bidding
LCB	Local competitive bidding
MHP	Micro-hydropower plant
MIDEPLAN	Ministry of Planning and Cooperation
MW	Power in megawatts
MWh	Electric power in megawatts-hour
NPV	Net present value
NRV	New replacement value
OC	Ordinary capital
PER	Rural electrification program
PNPV	Private net present value
PROPEF	Project Preparation and Execution Facility
PV	Photovoltaic
RESCO	Rural energy services companies
SEA	Strategic environmental assessment
SEBI	Basic investment statistics system
SEC	Superintendency of Electric Power and Fuels
SERPLAC	Regional Secretariat for Planning and Coordination
SIC	Central interconnected system
SING	Norte Grande interconnected system
SNI	National public investment system
SNPV	Social net present value
SUBDERE	Under Secretariat for Regional and Administrative Development
SVS	Superintendency of Securities and Insurance
UCN	SUBDERE National Control Unit
UCR	SUBDERE Regional Control Unit
UR	Regional units

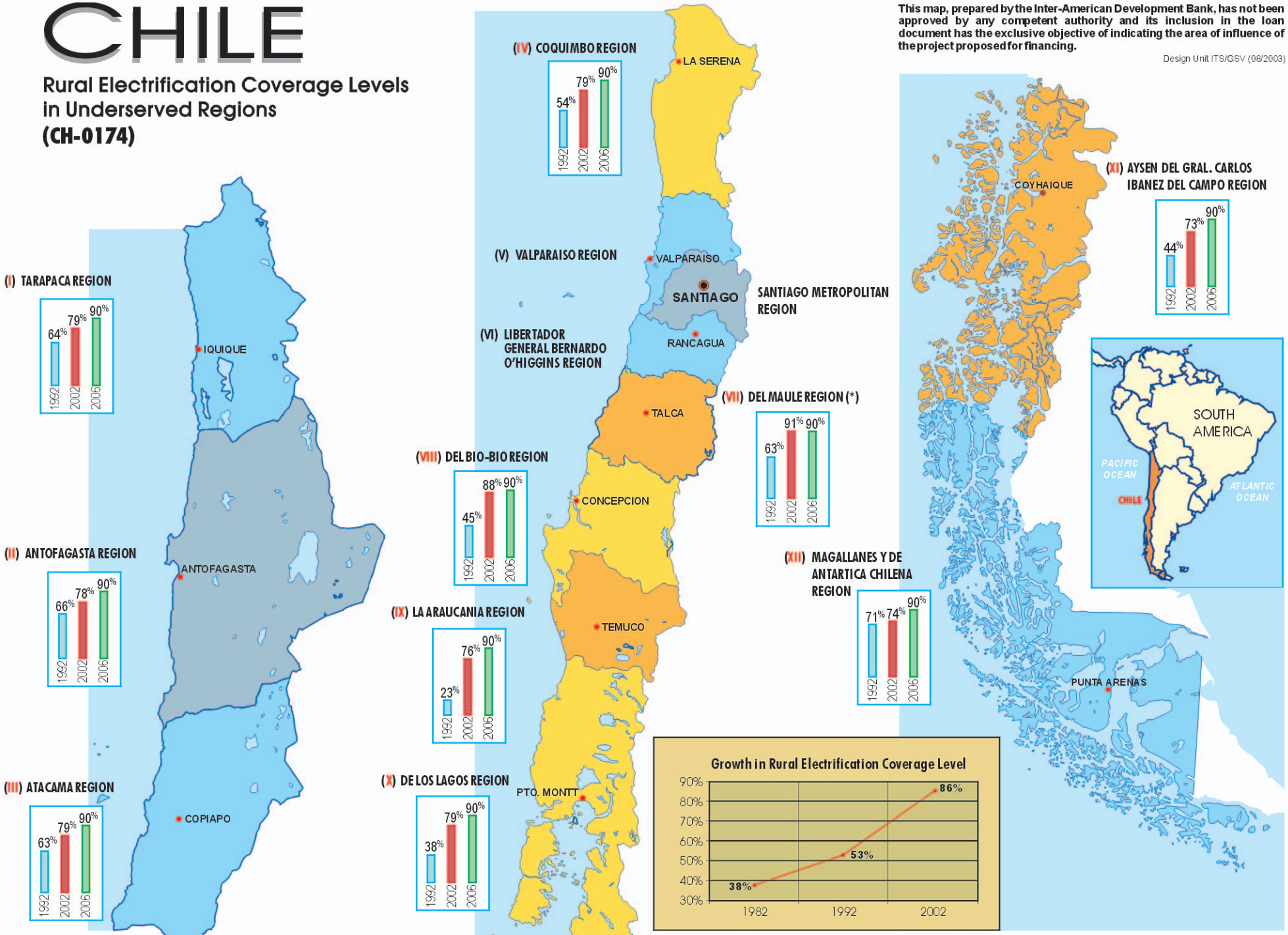
UT	Technical unit of a regional government or municipality
UTA-CNE	CNE Technical Support Unit
UTER	Rural electrification technical unit in a regional government
WB	World Bank

CHILE

Rural Electrification Coverage Levels in Underserved Regions (CH-0174)

This map, prepared by the Inter-American Development Bank, has not been approved by any competent authority and its inclusion in the loan document has the exclusive objective of indicating the area of influence of the project proposed for financing.

Design Unit ITS/GSV (08/2003)



Source: CNE, based on information provided by Regional Governments

(*) Rural electrification coverage level less than 90% in 2006, without new investment in rural electrification.

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IDB LOANS

APPROVED AS OF JUNE 30, 2003

	US$Thousand	Percent
TOTAL APPROVED	**4,865,763**	
DISBURSED	4,476,124	91.99 %
UNDISBURSED BALANCE	389,638	8.00 %
CANCELATIONS	905,385	18.60 %
PRINCIPAL COLLECTED	3,900,945	80.17 %
APPROVED BY FUND		
ORDINARY CAPITAL	4,619,599	94.94 %
FUND FOR SPECIAL OPERATIONS	203,336	4.17 %
OTHER FUNDS	42,827	0.88 %
OUSTANDING DEBT BALANCE	**575,180**	
ORDINARY CAPITAL	568,709	98.87 %
FUND FOR SPECIAL OPERATIONS	5,421	0.94 %
OTHER FUNDS	1,049	0.18 %
APPROVED BY SECTOR		
AGRICULTURE AND FISHERY	772,253	15.87 %
INDUSTRY, TOURISM, SCIENCE AND TECHNOLOGY	848,499	17.43 %
ENERGY	1,039,168	21.35 %
TRANSPORTATION AND COMMUNICATIONS	576,793	11.85 %
EDUCATION	40,694	0.83 %
HEALTH AND SANITATION	361,554	7.43 %
ENVIRONMENT	2,676	0.05 %
URBAN DEVELOPMENT	500,697	10.29 %
SOCIAL INVESTMENT AND MICROENTERPRISE	111,560	2.29 %
REFORM AND PUBLIC SECTOR MODERNIZATION	355,298	7.30 %
EXPORT FINANCING	3,857	0.07 %
PREINVESTMENT AND OTHER	252,713	5.19 %

* Net of cancellations with monetary adjustments and export financing loan collections.

Inter-American Development Bank
Regional Operations Support Office
Operational Information Unit

Chile

Tentative Lending Program

2003

Project Number	Project Name	IDB US$ Millions	Status
*CH0179	Costanera Norte Highway System	75.0	APPROVED
CH0174	Rural Electrification Program	40.0	
*CH0171	Antofagasta Desalinization Project	7.5	
CH0178	Chile Mas Seguro Program	10.0	
CH0172	Community Based Tourism in Chiloe & Palena	10.5	
	Total - A : 5 Projects	**143.0**	
	TOTAL 2003 : 5 Projects	**143.0**	

2004

Project Number	Project Name	IDB US$ Millions	Status
CH0175	Modernization of Public Real Estate Management	80.0	
CH1001	Strenghtening of Digital Strategy in Chile	N/A	
	Total - A : 2 Projects	**80.0**	
	TOTAL - 2004 : 2 Projects	**80.0**	
	Total Private Sector 2003 - 2004	**82.5**	
	Total Regular Program 2003 - 2004	**140.5**	

*** Private Sector Project**

INTERAMERICAN DEVELOPMENT BANK
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STATUS OF LOANS IN EXECUTION

AS OF JUNE 30, 2003

(Amount in US$ thousands)

APPROVAL PERIOD	NUMBER OF PROYECTS	AMOUNT APPROVED*	AMOUNT DISBURSED	% DISBURSED
REGULAR PROGRAM				
1999 - 2000	4	509,294	176,295	34.62 %
2001 - 2002	2	49,800	3,315	6.66 %
PRIVATE SECTOR				
2001 - 2002	1	25,000	15,254	61.02 %
TOTAL	7	$584,094	$194,864	33.36 %

* Net of cancellations. Excludes export financing loans.

RURAL ELECTRIFICATION PROGRAM

(CH-0174)

EXECUTIVE SUMMARY

Borrower:	Republic of Chile	
Executing agency:	Under Secretariat for Regional and Administrative Development (SUBDERE). The National Energy Commission (CNE) will act as co-executing agency for the program	
Amount and source:	IDB: OC	US$40.0 million
	Local:	US$17.2 million
	Total:	US$57.2 million
Financial terms and conditions:	Amortization period:	20 years
	Grace period:	48 months
	Commitment period:	42 months
	Disbursement period:	48 months (maximum) 36 months (minimum)
	Interest rate:	variable
	Inspection and supervision:	1%
	Credit fee:	0.75%
	Currency:	Single Currency Facility in U.S. dollars

Objectives: The program's general objective is to help improve living conditions and reduce social alienation among the low-income rural populations in those regions of the country with the lowest rural electrification coverage rates, and to strengthen the decentralization process, further build up the management capacity of municipal and regional governments, achieve the optimal distribution, and make efficient use of public resources.

Description: To these ends, the program will support: (i) creation and execution of an incentives program to induce private investment in rural electrification for grid-extension and self-generation projects; (ii) strengthening of the sectoral programming strategy and formulation, design, monitoring and evaluation of rural electrification projects; and (iii) electrification and/or improvement of the power supply to 36,600 residences, thereby helping to achieve the rural electrification coverage goal of 90% at the national and regional levels planned for 2006, while working to achieve sustainable investments,

improve service quality, lower the costs of the electrification projects from what they would be without the technical improvements that the program will introduce, and thereby minimize the State subsidy.

The program's total cost is US$57.2 million, which includes, in addition to the administrative costs, financial costs and contingencies, the following: (1) government incentives to induce private investment in rural electrification (estimated at US$47.7 million: US$32.3 million for the subcomponent to extend grids and regularize customers and US$15.4 million for the self-generation subcomponent), the objective being to electrify an additional 32,800 rural residences, and to improve the electric power supply to another 3,800 rural residences; and (2) institutional strengthening, training and social marketing (US$1.3 million), to support the introduction of procedural and institutional improvements and to conduct the program's social marketing and training activities.

Specifically, the self-generation projects will bring electric power services to the poorer and more isolated communities in the country, which in many cases are beyond the electric power grids' reach. These projects will also aim at introducing and spreading the use of clean power generation technologies through micro-hydropower plants (MHPs), hybrid generation groups combining wind/diesel power, photovoltaic panels (PV), among others. In this case, small and micro businesses would also benefits as suppliers of electric power service.

The Bank's country and sector strategy:

Consistent with the Chilean government's program, the objective of the Bank's strategy is to increase competitiveness, reduce social and regional inequalities, improve the quality of life of the citizenry with emphasis on the more vulnerable groups, and modernize the State. The proposed program fits into that strategy, as it will improve the quality of life in remote rural communities where poverty in those regions of the country is concentrated, thus reducing the disparities observed among the regions today. The Bank's participation will allow for intelligent orchestration of activities in the fields of rural development, poverty and energy.

One of the priorities of the Bank's Energy Sector Strategy is to support the public sector in the countries of the region with improving the rural electrification coverage levels. Given the generally low financial returns from investments of this type and absent public sector intervention, the private sector—which now handles energy distribution in most countries of the region—lacks sufficient incentive to expand its systems and provide electric power services to poorer users, many of whom live in remote areas. In its energy sector strategy, therefore, the Bank recognizes that efficient State

intervention is needed in this area. The strategy underscores the importance of any support that can be given to rural electrification programs.

Coordination with other agencies: The proposed program has been coordinated with the project on "Removing Barriers to Rural Electrification with Renewable Energy," which the National Energy Commission (CNE) has been executing since 2001 with a grant of US$6 million from the Global Environment Facility (GEF) (paragraph 1.25). The proposed program will be paralleled by a new World Bank rural infrastructure operation, now in the early stages of preparation. That program's objective will be to increase poor rural communities' access to and use of infrastructure services and to upgrade the quality of those services. (paragraph 1.24).

Environmental and social review: The features of the rural electrification projects that are part of the program are such that they need not be examined using the environmental impact assessment system (EIAS). The strategic environmental assessment (SEA) done at the request of the Committee on Environment and Social Impact (CESI) and made available to the public on 5 September 2002, concluded that: (a) the negative environmental impacts expected from the projects under the program are essentially direct and temporary (and for the most part occur during the construction phase), fairly negligible and predictable, and can be mitigated using measures and specifications that will be built into the project approval process and figure in the contract documents between the regional governments and private enterprises; (b) electric power distribution in rural areas (grid extension and self-generation) has significant positive environmental and social impacts, including better use of energy sources and less reliance on nonrenewable fossil fuels, and an improvement of economic and social conditions in the beneficiary rural community; and (c) after consulting with the indigenous and *campesino* communities that the program will serve (paragraphs 4.18, 4.25), the conclusion was that consumption subsidies were not needed and that social marketing to the indigenous and *campesino* communities need not be stepped up (paragraphs 4.22 and 4.25). With those findings in mind, the program makes provision for proper management of social and environmental impacts (paragraphs 3.31 to 3.33) and for building up the environmental management capacity of the institutions directly involved (paragraphs 2.19, 2.23, 2.24, 3.10, 3.13, 3.14, 3.33 and 4.18). Finally, the added emphasis on community participation and the measures to disseminate the program in the more remote areas will make the self-generation projects to be funded more sustainable (paragraphs 3.17 and 4.5). The CESI approved the project report at its meeting 22-03 on 13 June 2003.

Benefits and impacts on development:

The proposed program will assisting in achieving the Chilean government's goal of 90% rural electrification coverage in the rural areas of each of the country's 13 regions by the end of 2006. The incentives to private investment in rural electrification in poorly served areas are expected to induce the power distribution companies to connect almost 29,000 families to the grids, and to supply or improve electric power service to close to another 8,300 families living in remote areas where extending the distribution grids is neither technically nor economically feasible.

Because it focuses on the country's poorest rural areas, the proposed program will improve the quality of life, promote new productive activities, create new opportunities to generate income and jobs, and reduce poverty in those regions of the country. The self-generation projects, which will replace the more polluting sources of energy and mean less reliance on fossil fuels, are expected to improve air quality in these regions.

The program will be instrumental in introducing and implementing a set of technical and procedural improvements that will minimize the unit costs of the new projects, make more efficient use of the investment funds, and significantly reduce the size of the state subsidy needed.

Finally, implementation of the institutional strengthening component will bolster the capacity of the CNE, SUBDERE and the rural electrification technical units in the three regions where the rural electrification coverage rate is lowest, so that those units are better able to formulate, evaluate and monitor rural electrification projects.

Risks:

One risk of the program is that the smaller subsidies to be offered might ultimately prove to be too small to stimulate private investment, especially in rural distribution markets, which become more and more costly and difficult to operate as they move into the more remote and scattered areas. A mitigating factor here is that the improvements to be introduced will bring investment costs down and less will be required of the companies in the way of funds. During the program's design phase, an effort was made to include the observations that the distribution companies and electric power cooperatives made about previous stages of the rural electrification program (PER), which since the mid-90s has been carried out with local resources.

One risk specific to the area of self-generation using renewable energy is that the private sector might not be very interested in investing in or funding new business modalities, as the cost of the initial investment in these offline technologies is high, standards and equipment

certification are lacking, and private and public users know relatively little about how to manage, execute, operate and maintain these systems. To mitigate this risk, the Project Preparation and Execution Facility (PROPEF) funded studies to find alternative ways to lower the technical and non-technical barriers to the use of renewable energy sources. Those alternatives were built into the design of the self-generation component.

Because self-generation projects are often administered by smaller companies, NGOs or community associations, the technical, financial or institutional sustainability of these projects could be low. To offset this risk, only those self-generation projects that can demonstrate adequate financial and institutional mechanisms will be eligible.

Finally, one risk of the program are the weaknesses found in the technical units of municipalities, regional governments and regional secretariats for planning and coordination (SERPLAC), which will formulate, evaluate and execute the rural electrification projects funded by the National Regional Development Fund (FNDR) and the National Regional Development Fund-Rural Electrification (FNDR-ER). This risk will be mitigated through measures taken to strengthen these bodies institutionally and by including the CNE as technical advisor and co-executing agency of the program, to ensure that the quality and technical efficiency of the investments are adequate.

Special contractual clauses:

(a) **Conditions precedent to the first disbursement of funds:** (i) the agreement between the SUBDERE, CNE, and the regional governments must be signed (paragraph 3.10); (ii) the interministerial committee must have been established and have entered into operation (paragraph 3.7); (iii) the UTA-CNE must be established (paragraph 3.9); (iv) the Operating Regulations must be in force (paragraph 3.16); (v) the model mandate agreement between the regional governments and their Rural Electrification Technical Units (UTERs) and model contract between the regional governments and the private sector for the grid extension and self-generation projects must be submitted, which are to feature the clauses recommended by the Bank (paragraphs 3.10 and 3.29); and (vi) the final version of, as agreed upon with the Bank, the institutional strengthening, training, and promotion plan for the various institutions involved in program execution (paragraph 3.15) must be submitted; (b) **conditions precedent to the first disbursement of funds earmarked for the component for government incentives for private investment in the program: (1) in each region participating in the program:** a data bank must be set up to support the CNE in establishing efficient unit prices for the inputs for the rural electrification projects and efficient costs for operation and maintenance of the rural

electrification systems (paragraph 3.11); (2) **in each of the participating regions**: (i) a chart of accounts must be set up in the respective regional government, that includes auxiliary accounts separate from the loan proceeds and local counterpart funding, for accounting purposes (paragraph 3.38); (ii) the respective technical unit (UT) or rural electrification technical unit (UTER) must be formed and personnel to operate the unit detailed (paragraph 3.15); (iii) professionals attached to the UTs, UTERs, SERPLACs, regional governments, the SUBDERE regional control unit (UCR), and project managers from the communities in the respective regions, must be trained in social and environmental topics, in accordance with the institutional strengthening, training, and promotion plan for the first year of program execution (paragraph 3.15); (c) **by the end of the program's first year of execution:** the executing agency must submit an ex post evaluation report on self-generation projects conducted previously in Chile (paragraphs 2.17); and (d) **three years after the effective date of the loan contract:** the executing agency must submit a report containing the results of the implementation of the program's social and environmental measures (paragraph 4.27c).

Retroactive financing and recognition of expenses: It is proposed that expenses incurred since 30 November 2002 be recognized retroactively, up to the equivalent of US$8 million against the local counterpart, and up to US$2 million against the Bank loan, provided the requirements established in the eventual loan contract have substantially been satisfied. Retroactive recognition would be for expenses incurred for: (i) studies, consulting services and outlays for institutional strengthening, training and social marketing; and (ii) incentives to private investment in rural electrification (paragraph 3.30).

Revolving fund: A revolving fund will be established and will not exceed 10% of the amount of the loan (paragraph 3.30).

Poverty-targeting and social sector classification: This program qualifies as a social equity-enhancing project, as described in the indicative targets for Bank activities mandated by the Bank's Eighth Replenishment (document AB-1704). It also qualifies as a poverty-targeted investment (PTI) (paragraph 4.30). The borrower will not use the 10% additional financing.

Exceptions to Bank policy: None.

Procurement: The threshold above which international competitive bidding will be required will be US$200,000 in the case of consulting services and US$300,000 for the procurement of goods. Price may be used as one of the criteria for selecting service providers, as provided in document GN-1679-3. When the selection of those service providers is based on

a combination of price and quality, price will not represent more than 30% of the weight of the selection factors (paragraph 3.28). Because the program will not be financing construction work and will instead finance incentives (mainly subsidies) set ex ante to induce the private distribution companies to invest in rural electrification in priority areas, the program's execution and administration makes no provision for tendering to build, operate or maintain the works (paragraph 3.29).

I. FRAME OF REFERENCE

A. Socioeconomic framework

1.1 Chile's good macroeconomic management in recent decades has created an environment friendly to private investment and conducive to the productive sector's development. With that have come considerable economic growth, new and better jobs, a marked decline in poverty levels,[1] and a downward trend in inflation.[2]

1.2 The result is that the Chilean economy has doubled in size since 1990, growing at an average annual rate of around 6%; per capita income and per-worker productivity were up by more than 60%; average wages increased by 50% in real terms; and more than 900,000 new jobs were created, bringing average unemployment down from 14.3% in the mid-1980s to 7.7% in the 1990-2002 period. Investment grew by almost 9 percentage points, from an average of 21.3% of GDP in the 1984-1989 period, to 29.8% of GDP in 1990-2002. Exports of goods and services rose at an average annual rate of 9%, increasing their percentage share of GDP from 29% in the second half of the 1980s, to around 45% at the present time.

1.3 Although recently the Chilean economy's growth rate has slowed, accompanied by an up-tick in unemployment,[3] mainly as a result of the unfavorable turn that the international economy has taken, expectations are that in the medium and long term the country will continue to maintain solid economic stability and speed up the already rapid pace of integration into the world economy, which has been the track that its growth strategy has followed in recent decades.

B. The energy and electricity sector

1.4 Chile was one of the first countries in the world to deregulate and privatize the energy sector. The electricity sector's market was deregulated in the 1980s, State companies were privatized, and the private sector stepped in to play a key role in investments. Before selling the electric power companies, the State separated them into generation, transmission and distribution businesses. The distribution

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1 According to the data from the most recent National Socioeconomic Survey (CASEN), in late 2000, 20.6% of the population nationwide was living in poverty; that figure was 23.8% in rural areas. This compares favorably to the 1990 figures, when poverty nationwide was at 38.6%, and rural poverty was at 39.5%. Extreme poverty is also down by more than 50% since 1990, which makes Chile the first Latin American country to achieve the extreme poverty reduction target set in the so-called "Millennium Development Goals."

2 As of December 2002, inflation (CPI) for the previous 12 months was 2.5%.

3 In 2001, GDP growth rate was 2.8%, whereas it was 2.1% in 2002. Nationwide unemployment averaged 9% in 2002, slightly less than the 9.3% for 1999-2001, although much higher than 6.2% unemployment for the period 1996-1998 (seasonally adjusted data).

companies were then franchised according to their areas of operation, but were not given exclusive distribution rights in those areas.[4]

1.5 After putting in average annual growth rates of 6.9% between 1990 and 1999, in recent years total energy consumption in Chile as pulled back and is now increasing at an average annual rate of 1.5%, principally as a result of the economic slowdown that began in 2000. Following a trend found in previous years, the country's energy picture has also undergone a major change, brought on by the increase in the consumption of natural gas. At the present time, hydropower and natural gas represent around 40% of the gross consumption of primary energy, almost double the figure in the last decade.[5]

1.6 **The regulatory framework of the electricity sector.** The regulatory framework of the electricity sector creates free competition in generation, nonexclusive distribution rights, and a pricing scheme based on marginal costs so that prices reflect the real costs of producing, transmitting and distributing energy efficiently, thereby promoting efficiency and competition among the system's various stakeholders. The regulatory framework is made up of the Electric Power Services Act,[6] its regulations, and the laws creating the National Energy Commission (CNE) and the Superintendency of Electric Power and Fuels (SEC). The CNE prepares the energy sector's plans and policies and projects electricity tariffs, national energy demand and supply, price levels, and so on. For its part, the SEC is authorized to award franchises, to require franchisers to keep up the quality of the service and, in general, to supervise compliance with the electric power regulations. The Electric Power Bill I now before the Chilean Congress proposes measures that would make improvements in the sector's regulatory framework while promoting increasing competition in the electric power generation market and better and more reliable services at reasonable costs to the consumer.

1.7 **Electricity systems**. Chile has four interconnected electric power systems: the Norte Grande Interconnected System (SING), covering the territory between the cities of Arica (Region I) and Antofagasta (Region II) and accounting for 33% of the country's installed capacity; the Central Interconnected System (SIC), which runs between the cities of Taltal (Region II) and Chiloé (Region X) and accounts for 66.2% of the country's installed capacity; the Aysén System, which supplies consumption in Region XI and accounts for 0.2% of the installed capacity, and the

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4 At the present time, the national electric power industry is a combination of 31 generating businesses, 5 transmission businesses and 36 distribution businesses. Taken together, these businesses represent a combined national demand that was over 42,000 GWh in 2002. In terms of territory, that demand is serviced by four interconnected electric power systems.

5 That figure was 22% in 1992.

6 The electric power sector is regulated by DFL No. 1 of 1982, and by the electric power regulations DS No. 327 of 1997, and the subsequent amendments thereto.

Magallanes System, which supplies Region XII and accounts for 0.6% of the country's installed capacity.[7]

1.8 Chile's urban zones are completely electrified. In order to get electricity to rural areas, Chile launched an ambitious rural electrification program in the mid-1990s. The program has succeeded in putting Chile on a par with Costa Rica, with the highest rates of rural electrification coverage in Latin America. That program was designed to fit with the reforms in the sector; in other words, it was based on competition, private investment and decentralized decision-making, preserving a secondary role for the State.

1.9 **Chile's National Rural Electrification Program (PER).** The PER, which the Government of Chile created in late 1994, is part of the government's strategy for conquering poverty, improving the rural sectors' quality of life, and mainstreaming them into the economic and social development process underway in the rest of the country. Its specific objectives are to provide a solution to the electricity needs in rural areas, promote productive development and improve health and educational opportunities for rural families, while ensuring a steady flow of public investments targeting those very objectives. The following are some of its main features:

a. **Management model**. The PER operates by a model of decentralized management among the regions and shared public-private financing. State subsidies are to induce private businesses to help achieve the government's coverage-expansion goals by making private investments in rural electrification not just an **attractive business opportunity for distributor companies,** but also an efficient and sustainable means of achieving the country's economic and social development goals;

b. **Project eligibility**. The only eligible projects are those that are community-demand driven. Using the project evaluation method established by the Ministry of Planning and Cooperation (MIDEPLAN) and the CNE, eligible projects must also demonstrate that they will have a positive social net present value (SNPV),[8] establish the users' willingness to pay for the service, meet the country's social and environmental standards, and be a priority of local governments in the regional planning process;

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[7] Almost all the potential beneficiaries of the expansion of networks under the program live in the generation, transmission and distribution area of the Central Interconnected System (SIC), which has a capacity of 6,646 MW (66.2% of the country's installed capacity) and supplies electric power to over 90% of Chile's population.

[8] The SNPV is figured on the basis of the social benefits (improved well-being, defined as the consumers' net surplus as a result of the project's implementation) gained from introducing the service and the costs that the country incurs to supply them (shadow price of the inputs used, discounted at the social discount rates set by MIDEPLAN).

c. **State subsidy**. The state subsidy will be awarded solely for investment and will equal the private net present value (PNPV).[9] When electrification is achieved by building out grids, then users must cover all hook-up costs, which include in-house wiring, the meter and the coupling to the grid;

d. **Financial sustainability.** To ensure that the projects are financially sustainable, the tariff must cover, at a minimum, all the costs of operating, maintaining and administering the service for the duration of the project's useful life;

e. **Regional administration**. The financing that the State provides is funneled through the National Regional Development Fund (FNDR), which is administered at the regional level and includes a provisional fund reserved exclusively for rural electrification projects (FNDR-ER). Under a mandate agreement, regional governments authorize the technical units (UTs) or rural electrification technical units (UTER) to contract with private distribution companies for the programs that electrify rural residences by extending grids, and to call for proposals from and award contracts to the businesses or cooperatives that will provide the service;

f. **Tariff-related issues**. The tariff[10] charged by the distributors or cooperatives reflects the marginal costs of supplying the electric power (paragraph 1.6), and is calculated by the CNE and established through tariff decrees issued by the Ministry of Economy. As no pre-set tariff exists for the self-generation projects, that tariff will be set in an agreement between the municipality and the energy services provider and will be calculated to keep the services' financially sustainable.

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[9] This is the difference between the costs of capital for the initial investment and the present value of the flow of tariff payments and the costs of operating, maintaining and administering the project for a 30-year evaluation horizon, discounted at a real rate of 10%. Under Chile's tariff system, regulated tariffs must cover all costs of operating and maintaining the system and only those investments that the private businesses actually paid for are factored in when the calculation is made. In other words, all inputs resulting from the payment of state subsidies are excluded from the baseline for calculating the new replacement value (NRV) of the electric power distribution facilities. These subsidies are consistent with the Bank's public utilities policy, as they are based on an objective and transparent allocation mechanism and are intended to bring electric power service to the rural poor not currently serviced.

[10] Final tariffs to regulated customers = "node" price + DVA. The "node" price is what the energy distribution company pays the generation company (it represents around 50% of the final tariff and varies with the cost of natural gas, oil, reservoir levels, etc.). The DVA is the distribution value added (which is the cost of a model company's distribution business in 6 typical areas of the country). The rates for small residential consumers have only two components: a fixed charge and a variable energy charge (the "node" price and the DVA are built into the second of these two charges). The fixed charge covers the administrative and operating expenses, exclusive of monthly consumption, and the energy charge is obtained by multiplying consumption in KWh by its unit price. These rates adequately reflect the marginal costs of providing the service to the end user and are, therefore, fully consistent with the Bank's Public Utilities Policy.

1.10 **Initial analysis of the PER.** The number of rural residences electrified each year has more than doubled since the PER was launched, from an average of 9,500 per year in 1992-1994, to an average of over 19,000 units a year in the period 1995-1998. The results of the population and housing census conducted on 24 April 2002, confirm the powerful impact that the PER has had, which in just 10 years' time increased national coverage from 53.1% in 1992 to 85.7% by April 2002.

1.11 Rural electrification coverage was up markedly in all regions of the country between the 1992 and 2002 censuses. Coverage in regions V (Valparaíso), VI (General Bernardo O'Higgins) and the Metropolitan Region surpassed the 90% goal; regions I (Tarapacá), II (Antofagasta), III (Atacama), VII (Maule), VIII (Bio Bio), XI (Aysén) and XII (Magallanes) will soon be hitting the 90% coverage goal, as the number of residences still without electric power is very low. On the other hand, the most recent census shows that as of 2002, relatively speaking rural electrification coverage was still low in regions IX (Araucanía) at 76%, and X (Los Lagos) at 79%. These two regions are the most rural, have the highest number of non-electrified rural residences and a large indigenous population. In region IV (Coquimbo), the coverage deficit (21%) is made up of very isolated and scattered rural residences.

1.12 Given this situation, the focus of the new operation will be to increase public resources and preferably target them at those regions with the largest coverage deficits, specifically regions IV, IX and X, which is where more than 88% of the number of rural residences without electric power are located. The new program will also endeavor to introduce and disseminate the use of new self-generation (offline) technologies, such as micro-hydropower plants, photovoltaic panels and wind energy, so as to increase coverage, improve the quality of the energy supply or increase the number of daily hours of energy in remote communities that cannot be supplied by extending the existing electric power distribution grids.

1.13 While significant progress has been made using the existing financing mechanisms, in recent years the regions are investing less and less of their available FNDR budget in rural electrification; some regions' investments in projects of this type come strictly from the portion of the FNDR budget that is reserved for rural electrification (FNDR-ER). As a result, the central government resources earmarked for rural electrification, which in 1995 represented 33% of the total public investment delivered as a subsidy for rural electrification, were at 63% by the year 2000.

1.14 Taking into account the progress made in 2002, it was estimated that close to 33,000 rural residences in 10 of the 13 regions still needed to be electrified to achieve the government's goal of 90% rural electrification coverage both nationwide and in each region of the country by 2006. As said earlier, 88% of those units are in regions IV, IX and X, while the remaining 12% are in regions I, II, III, VII, VIII, XI and XII.

C. Lessons learned and areas where improvement is needed

1.15 While Chile is on Latin America's front line in terms of both rural electrification coverage and implementation of sustainable rural electrification projects, the country's considerable experience with programs of this type was examined when preparing this program and revealed a number of areas that could be improved in this new phase of the PER.

1.16 In the case of the self-generation projects, pilot projects based on nonconventional renewable energy sources[11] had relatively low sustainability and availability figures, which is why a large portfolio of projects of this type never materialized in the past (the isolated projects have basically relied on diesel generators). One lesson learned regarding solutions of this type is that selecting a management scheme suitable for each project is vital to ensuring sustainability. While international experience with renewable energy is still limited, not enough to know precisely which scheme for managing self-generation systems is best for each situation, the schemes being tested worldwide include a key stakeholder, usually referred to as the "energy services provider" (or provider). The "provider" could be any of the following: (i) a traditional distributor or electric power cooperative; (ii) a municipal electric power company; (iii) a private company formed specifically for this function (in general a micro- or small enterprise like the Rural Energy Services Companies – RESCO); (iv) a group of users, or (v) a nongovernmental organization (NGO).

1.17 One preliminary finding drawn from these international experiences is that the self-generation systems that seem to have the best chance of long-term success are those managed by the private sector, whether they be electric power cooperatives or small or micro businesses that are energy service providers along the lines of the RESCO. The RESCO system appears to be among the most promising, because it spreads the risk among the principal stakeholders, incorporates mechanisms that create competition for the allocation of government subsidies, and helps bring new stakeholders into the market. The key seems to be in getting a company to provide the service under a contract stipulating its responsibilities for system operation and maintenance, so that such functions are not left to the user or in the hands of an entity having no clearly defined contractual obligations. Here, another important lesson learned in connection with self-generation projects is that scale is absolutely critical; when the system is serving a relatively high number of users, it can generate sufficient income to cover the administrative and operating costs of a dedicated service provider.

1.18 To learn from the abundant experience that Chile has amassed in executing rural electrification programs, a preparatory technical workshop was held in Puerto Varas

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[11] Chile's experience with specific self-generation project shows that the service interruption rate (the percentage of the year that the equipment is out of service) varies substantially according to the technologies used and the management models introduced.

in late April 2002, with support from the Project Preparation and Execution Facility (PROPEF) (CH-0176, approved in March 2002). The workshop was attended by the various actors involved in the PER's execution and pinpointed a number of areas where the proposed new program can make improvements.

1.19 The workshop's findings focused on improving various key factors related to the coordination, monitoring and feedback mechanisms needed for the new project to be able to accomplish the established coverage criteria. The participants concluded that the lessons learned from the PER and the improvements it needs mainly have to do with the following: (a) **institutional coordination** with regard to the lack of territorial planning when projecting investment in the electricity grid, a lack of consistency among the various regions in terms of the roles that the municipalities' technical units play, insufficient technical capacity in some municipalities to propose projects, and a lack of coordination with other existing sources of financing; (b) **design**, caused by the lack of sufficient resources to finance demand and engineering studies; (c) **evaluation**, which concerns the lack of tools to verify the unit costs offered, preparation of designs by the distribution companies themselves, possible underestimate of demand, lack of a tariff framework for isolated systems, doubts about the adequacy of the discount rate used and the difficulty of factoring in a quantification of the projects' externalities; (d) **prioritization**, regarding the need to improve the criteria used at the local level for sectoral allocation of FNDR resources and whether those resources are sufficient to accomplish the government's rural electrification coverage goals; (e) **execution**, which has to do with the fact that the end users are people of little means (which means it is difficult for them to pay for the household electric power connections), the established electric power companies' refusal of projects executed through third parties, doubts about property titles for purposes of establishing rights of way, a dearth of standards for the self-generation options, and a technical capacity that falls short of what is needed for the technical and environmental monitoring and to take delivery of the works; and (f) **follow-up**, which concerns the failure to measure the evolution of consumption, informality in preparation of the project completion report, and the absence of any ex post evaluation of the PER. All these observations, coupled with the corresponding recommendations proposed at the Puerto Varas workshop, were the basis for the PER improvements added to the present program and described in greater detail in the chapters that follow.

1.20 Other problems identified included: (i) a project evaluation method that does not take sufficient account of social and environmental benefits; and (ii) a growing tendency among the companies that execute rural electrification projects in the various regions to become monopolies. The principal positive aspect singled out in both the workshop and the results of the April 2002 census is that quality of life in the communities served by rural electrification improved significantly, facilitating access to education, health, basic goods and services and productive development.

D. The strategy of the country and of the Bank

1.21 Like that of the Chilean government, the Bank's strategy is to increase competitiveness, reduce social and regional inequalities, improve people's quality of life, especially the more vulnerable groups, and modernize the State. The proposed operation fits into that strategy, as it will raise the quality of life in remote rural communities where poverty in those regions of the country is concentrated, thus reducing the regional disparities one finds today. The Bank's participation will also allow for intelligent orchestration of activities in the fields of rural development, poverty and energy.

1.22 One of the priorities the Bank identifies in its Energy Sector Strategy[12] is the need to **help the governments of the countries of the region improve rural electrification coverage.** While the economic rate of return on projects of this type is generally high (e.g., a high social return), the financial rate of return on investments of this type tends to be low absent government interventions. Hence, such investments are not generally attractive to the private sector, now in charge of energy distribution in most countries of the region, and do not entice them to expand their systems and provide electric power services to poorer customers, many of whom live in rural areas. In its energy sector strategy, **the Bank recognizes that efficient State intervention in this area is needed** and underscores the importance of the support that can be provided in this field.

1.23 The Bank has contributed to the development of Chile's rural electrification subsector through three loans (578/OC-CH, 853/OC-CH and 1281/OC-CH) to the FNDR, totaling US$585 million. These loans have gone toward a series of social infrastructure projects (including rural electrification projects).[13] The resources allocated to rural electrification under these programs totaled approximately US$125 million in the 1995-2000 period and were fully matched by the local counterpart. Within the social investment programs conducted under the broader programs, however, rural electrification was just one entry on a diverse menu of investment options (with projects in education, health, water supply and sanitation, street and highway paving, and the like heading the list), without any real link to a broader sectoral strategy for rural electrification. The program being proposed here, on the other hand, represents the Bank's first loan in Chile that is earmarked specifically to finance incentives to private investment, for electrification of some 33,000 rural homes between 2003 and 2006, as part of the Bank's new energy sector strategy.

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[12] IDB. Energy Sector Strategy, GN-1969, 4 February 2000.

[13] Execution of the first two programs has already been completed. The third program (1281/OC-CH) was declared eligible for disbursements in July 2001. As of May 2003, US$102 million (34% of the total) had already been disbursed. Execution of this third program is considered to be entirely satisfactory and the probability that its development goals will be accomplished is very high.

E. The experience of other multilateral organizations

1.24 The World Bank is undertaking preparation of a rural infrastructure program in Chile whose objective will be to make infrastructure services more accessible to poor rural communities and to improve the quality and use of those services. In addition to institutional strengthening, the project will feature activities in water supply and sanitation, telecommunications, transportation, energy self-generation, micro-irrigation, and flood control.

1.25 In addition, since 2001 the CNE has been executing the GEF-CNE-UNDP project on "Removing Barriers to Rural Electrification with Renewable Energy," with a grant of US$6 million from the Global Environment Facility (GEF). This program will craft suitable technical standards for electrification systems that draw on renewable energy sources, certification procedures for those systems, and a sizeable portfolio of sustainable self-generation projects and evaluations of self-generation programs previously conducted in the country.

F. Rationale of the proposed program

1.26 The proposed program seeks not just to stimulate private investment in the sector, but also to make some improvements to the existing procedural and institutional framework, making optimal use of public resources and targeting incentives so that they benefit the poorest and most needy rural communities, especially in the three regions of the country where rural electrification coverage is lowest (regions IV, IX and X).

1.27 There is broad consensus that making modern energy sources accessible to poor rural families and communities has important effects—direct and indirect—on improving their well-being and that an electric power supply brings both monetary and non-monetary economic benefits as it lowers the costs of obtaining the energy services those communities need.[14] The following are among the direct positive effects: (i) better access to lighting, heating and refrigeration; (ii) monetary savings because less is spent on electricity than on alternative energy sources (candles, batteries, deep-cycle batteries, kerosene, etc.); (iii) the time and effort saved, especially for women, both on household work and on stocking up on alternative energy sources; and (iv) better access to information and learning through radio, television and telecommunications. There are also important indirect benefits to be gained in areas such as: (i) health (improving air quality within the home; less risk of fire; more accessible and better quality health services); (ii) education (better access to lighting, so that one can spend more time at night engaged in reading and study; the time and effort saved that can be spent in learning activities); (iii) new economic and social opportunities for the poor (better facilities that enable

[14] See: "Measuring Developmental Impact of Rural Electrification Projects." Document prepared by Jaime Millán, SDS, Inter-American Development Bank, Washington, D.C., June 2002.

businesses to be created and improve output in businesses that provide jobs to low-income workers in rural areas, especially micro businesses; creation of jobs in businesses supplying rural energy infrastructure services; a pickup in local business activity; more opportunity to organize events and provide community services); and (iv) positive effects on the environment (use of energy sources that cause less pollution and contamination; greater reliance on renewable energy sources), among others.

II. THE PROGRAM

A. Objectives and description

2.1 The program's general objective is to help improve living conditions and reduce social alienation among the low-income rural populations in those regions of the country with the lowest rural electrification coverage rates, and to strengthen the decentralization process, further increase the management capacity of municipalities and regional governments in the area of rural electrification, and achieve the optimal allocation and efficient use of public resources earmarked for regional investment in the sector.

2.2 The specific objectives of the program are: to create and introduce an incentives program to induce private investment in rural electrification for grid extension projects and projects beyond the grids' reach (self-generation); and to strengthen sectoral programming and formulation, design, monitoring and evaluation of rural electrification projects.

2.3 Using incentives to induce private investment in rural electrification, targeted at the most needy regions of the country, the program will help achieve the rural coverage goal planned for 2006, which is 90% at both the national level and in each region of the country. It will also work to ensure the sustainability of the investments, improve service, lower the costs of the electrification projects from what they would have been without the technical improvements and planning that the proposed program will introduce in the evaluation method,[15] and the reduction of the state subsidy that result. The program will also look to increase the number and type of stakeholders by incorporating small and micro entrepreneurs as providers of electric power self-generation services.

B. The program's structure

2.4 The program's total cost is US$57.2 million. The Bank loan would finance US$40 million of that amount, and the Government of Chile the remaining US$17.2 million, which would come from the Chilean government's budgetary appropriations.[16] The program's direct costs, which total US$49 million, are divided between two components: a component involving government incentives to private investment in rural electrification, at a total cost of US$47.7 million; and a second

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[15] Prominent among the improvements to be introduced for the grid-extension projects are the following: new residential demand curves; inclusion of demand from income-producing activities; exclusive recognition of least-cost posts, and so on.

[16] Estimates are that in addition to the program's resources, contributions from the private sector and end users would total another US$14.8 million.

component for institutional strengthening, training and social marketing, at a total cost of US$1.3 million.

1. Component for government incentives to private investment in rural electrification (US$47.7 million)

2.5 The cost of the component for government incentives to private investment in rural electrification, to be carried out mainly in the three regions that now have the lowest percentage of rural electrification coverage (regions IV, IX and X),[17] is estimated at U$47.7 million. Of that amount, US$32.3 million will be for the grid-extension subcomponent, and the other US$15.4 million for the self-generation subcomponent. The bulk of these incentives, US$45.2 million, will go toward covering the cost of the state subsidies to private investment, while the remaining US$2.5 million will be used to finance studies supporting the self-generation projects.

2.6 The incentives are a subsidy paid to the distribution companies in the amount required to raise the individual rural electrification projects' ex ante financial rate of return by 10%, and to conduct the studies to help carry out self-generation projects. According to the MIDEPLAN method, the maximum amount of a subsidy, which the provincial governors and the distribution companies for each individual rural electrification project can negotiate, is to equal the (negative) net present value of the flows of private investment actualized at a real discount rate of 10% per annum, with a ceiling determined by the original investment cost estimated for that project. Once it has been negotiated and set, the amount of the subsidy cannot vary and any cost overruns will have to be covered directly by the distribution company or electric power cooperative responsible for the project.

2.7 This component will attempt to introduce a number of procedural improvements in the PER, which were identified as the program was being prepared. These procedural improvements include: a 30-year time horizon for evaluation of rural electrification projects; recognition of minimum technical specifications when calculating the cost of the project and of the maximum subsidies that can be given; use of new demand curves in the various regions that will be part of the program; inclusion of demand for productive uses when figuring the projects' future earnings; and adjustments in the formula to be used to figure technical distribution losses. Some of these improvements were recently introduced into the new Rural Electrification Project Evaluation Method established by MIDEPLAN-CNE.[18]

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[17] Although 87.4% of the resources from this component would go into these three regions, the program will also feature projects in another seven regions where the coverage figures are already nearing the 90% goal (regions I, II, III, VII, VIII, XI and XII).

[18] MIDEPLAN-CNE. Evaluación de Proyectos de Electrificación Rural. Final document. Santiago de Chile, December 2002.

a. Subcomponent for grid extension (US$32.3 million)

2.8 With this subcomponent, incentives will be offered to get distribution companies and cooperatives to invest in electrification of some 28,300 residences in the needy regions so that by program's end, rural electrification coverage of at least 90% will have been achieved in every region of the country.[19] This subcomponent has two modalities: electrification of localities and regularization of customers.

2.9 The **locality electrification** modality represents 97% of the grid extension subcomponent and accounts for US$31.4 million. The resources will go exclusively toward the state subsidies needed to make the various private rural electrification projects financially viable in the ten regions that have not hit the 90% goal. The provincial governors will negotiate the subsidies with those distribution companies or cooperatives willing to accept the terms of the new franchise. In negotiating the state subsidies with the private distributors, each participating regional government will have, in addition to its own technical unit, support from the CNE (UTA-CNE) as well. The latter will furnish information pertinent to determining the localities to be electrified and the size of the maximum state subsidy that can be offered as a fixed lump sum for each electrification project, scaled according to the optimal number of works, economic efficiency prices, actualized demand curves and the other improvements that PROPEF recommends.

2.10 Estimates are that under this modality around 26,300 residences would be electrified. Thus, the sample of 524 economically viable projects identified in different regions, involving a total of 16,700 residences, represents around 63.5% of the total number of residences to be covered via electrification of localities. The projects in that sample have already been properly evaluated and entered into MIDEPLAN's Integrated Public Investment Projects Bank (BIP).[20] The 14,700 units to be electrified in localities not included in the sample will come under other, new projects that the regional governments, with the support of the UTA-CNE, will have to identify while the program is underway. The figure was arrived at on the basis of the statistics from the population and housing census conducted in April 2002.

2.11 **Customer regularization,** at US$900,000 is for incentives to induce distribution companies to hook up some 2,000 residences that, although located in areas already online, were not, for one reason or another, electrified under programs conducted in the past. In this case, the state subsidy will be per end customer connected. The maximum amount will be calculated according to the evaluation criteria agreed upon by MIDEPLAN and the CNE. The final subsidy be set as the result of negotiations between the provincial governors and the distribution companies or cooperatives as the standard amount for each customer in the locality to be

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[19] Including another 4,500 residences to be electrified under the self-generation subcomponent.

[20] For more details on the BIP, see paragraphs 3.3 to 3.5.

connected who meets the eligibility criteria stipulated in the Operating Regulations of the program. The conditions are designed so that a project cannot be conceived as a way to recover the distributor's or cooperative's non-technical losses.

b. Self-generation subcomponent (US$15.4 million)

2.12 The subcomponent for investment in self-generation is to electrify or improve the supply of electric power to some 8,300 residences (electrification of 4,500 new residences and improvement of electric power service to another 3,800 rural residences), many of which have already been identified and included in the existing portfolio of self-generation projects evaluated for the analysis and scaling of this component.[21] The self-generation will rely on renewable energy sources, geared to preserving the environment, and on the use of diesel generators in localities where nonconventional fuels cannot be used because either the natural conditions are not present or the studies needed to use the renewable sources are not yet available.

2.13 With the self-generation projects, electric power services can be offered to the most far-flung communities, which are often beyond the reach of the grids. The idea is to introduce and spread the use of clean energy generation techniques using micro- and mini-hydropower facilities (hydroelectric energy),[22] aerogenerators (wind energy), photovoltaic panels (solar energy),[23] and the like. As pointed out in paragraph 2.15(b), this will be an opportunity for small and micro entrepreneurs to benefit as providers of electric power services.

2.14 The resources for this subcomponent will go into two categories: incentives to induce private investment in self-generation projects (US$12.9 million), and studies to support project development (US$2.5 million).

2.15 The US$12.9 million for **state subsidies to induce private investment in self-generation** will be competitively allocated to projects that yield social returns and whose adequate operation and maintenance over time can be assured. To ensure compliance with those sustainability requirements, the following provisions will be included in the program's Operating Regulations:

a. The UTA-CNE will provide technical support to the municipalities and the regional governments' technical units (UT) (which will be the rural electrification technical units—UTER—in those regions where such units either already exist or will be created—regions IV, IX, X and XI) during preparation of the self-generation projects. As soon as project formulation gets underway, it

[21] The sample of self-generation projects involves a total of 7,339 residences spread among the various regions of the country that have still not reached the 90% goal.

[22] Power level in the tens of kilowatts.

[23] Power level in the tens of kilowatts.

will examine such issues as the availability of local energy resources; verification of the least-cost solution; design and adequate technical and social and environmental specifications; and the tariff model, quality of service and management systems that will keep the self-generation systems operating and maintained for the duration of their useful life.

a. The UTA-CNE will provide technical advisory services to help establish and develop small businesses providing electric power services (patterned along the lines of the Rural Energy Services Companies – RESCO) to minimize the risk that too few qualified candidates answer the call for tenders on self-generation contracts.

b. The UTA-CNE will do performance evaluations of the individual projects and of the management systems, so as to be able to properly monitor a system's operation and make improvements to it. The electric power service contracts will include specific clauses requiring submission of audited financial statements on an annual basis and records of outages and their causes (service off-line), all to be used in the performance analysis.

2.16 The purpose of the category for **studies supporting project development,** at a total cost of US$2.5 million, is to encourage development of self-generation projects by carrying out the studies needed to help the regions formulate and prepare such projects. The funds will go toward studies of local renewable resources, demand, feasibility, engineering designs, and institutional arrangements that ensure the projects' sustainable management and operation.

2.17 **A clause in the loan contract** will stipulate that in the first year of execution an ex post evaluation is to be done of a sampling of self-generation projects conducted in earlier stages of the PER, so that any lessons to be learned from existing projects can be built into the design of future projects.

2.18 It is worth noting that without the added support that these studies will provide, the government and private actors would not be able to launch the first self-generation projects without extended delays. Delays of that kind would end up discouraging future investments in this area.

2. Component for institutional strengthening, training and social marketing (US$1.3 million)

2.19 This component will finance the contracting of specialized technical assistance to help introduce the procedural and institutional improvements (paragraph 2.7), and seminars and social marketing and training activities, including those that concern the social and environmental aspects of the program and that were proposed in the corresponding Strategic Environmental Assessment. Those consulting services will support the municipalities, the regional governments, the national control unit

(UCN) and the regional control units (UCR) of SUBDERE, MIDEPLAN's Regional Planning Secretariats (SERPLAC), and the other agencies responsible for PER management, helping them to strengthen the program's operating, monitoring, follow-up, control and evaluation systems.

2.20 The consulting services to strengthen the CNE and the UTs or UTERs—mainly economic in nature—is intended to determine efficient unit prices of the inputs that private businesses will use to carry out the projects, and the efficient costs of operating and maintaining the rural electrification systems. This will supply some of the most important information missing in the current process whereby the provincial governors and private distribution companies negotiate subsidies.

2.21 Finally, the training conducted under the program will include support with developing and supplying the instructive materials needed to give short-term courses to update and train professional staff of the various agencies and entities involved in the PER (regional governments, UTER, SERPLAC, UCR/SUBDERE, municipalities, etc).

2.22 In the self-generation area, the institutional strengthening component will take special care to assist the new private entities participating in the program, as the administration systems proposed will be managed by electric power cooperatives or small and micro enterprises that are RESCO-like energy services providers. It is vital that activities be conducted to induce private sector participation in investing in and operating these systems, to educate and encourage the user about the advantages and limitations of self-generation systems, to minimize the costs of supplying electric power to the more remote places, to guarantee the projects' environmental and social sustainability, and to provide better and more reliable services to the population that cannot be served by extending grids. Through these social marketing activities, potential users will be informed about the maintenance that self-generation systems require, their limitations, environmental protection requirements, and safety standards—especially in the case of the photovoltaic systems (PV)—the obligations and rights written into the corresponding tariff agreements, and be given a better understanding of the options available for increasing installed capacity to accommodate future increases in energy demand.

3. Program administration (US$1.7 million)

2.23 The resources allocated under the heading of program administration will finance the creation and introduction of a technical support unit attached to the CNE (UTA-CNE). Its purpose will be to provide technical and social and environmental assistance to the regional governments while the program is underway. The goal is to ensure the technical, economic, social, environmental and managerial feasibility of all phases of the rural electrification projects, while supporting the negotiations with distribution companies and cooperatives so that grids are used to maximum advantage; and to establish the rural electrification program's order of priorities

until the year 2006 and ensure proper development of sustainable self-generation projects. These resources will be in addition to the US$9.7 million in institutional strengthening funds to be channeled to the SUBDERE, MIDEPLAN and the regional governments under the program now underway for improvement of the efficiency and management of regional investment (1281/OC-CH), as that program did not plan any specific measures to strengthen the PER's operational capacity.

2.24 This category includes funds to strengthen the CNE's environmental management. Those funds will be used for a variety of purposes, which include training UTA-CNE professionals in social and environmental matters. In the regional governments' technical units (UTs) (or the rural electrification technical units—UTERs—in those regions where they either already exist or will be created, namely regions IV, IX, X and XI), the funds will be used mainly to provide social and environmental training to the professional personnel who help generate and monitor projects and who, when necessary, will act as inspectors of the projects built under the program in their respective regions. The training will be provided during the early stages of program execution (paragraph 3.15). Professionals from the UTA-CNE and from the UTERs in regions IV, IX and X who are trained in environmental and social issues, will devote at least 40% of their time to these matters. Judging from the analysis of the proposed operation and the on-site visits made during the program's preparation, the emphasis will have to be slanted toward technical matters in regions IV and IX and in the self-generation projects nationwide. In regions IX and X, special attention will also have to be given to social and environmental issues.

2.25 SUBDERE's capacity for management, monitoring and control will be bolstered by contracting accountants-auditors for its national control unit (UCN) and its regional control units (UCR). The UTs or UTERs, in combination with the UTA-CNE, will assist the municipalities with preparation of individual projects.

C. Scaling, cost and financing of the program

2.26 The program's investment incentives component was scaled on the basis of the rural electrification projects now in MIDEPLAN's Integrated Public Investments Projects Bank (BIP) and in the regional governments, municipalities and energy distribution companies (paragraphs 2.10 and 2.12).

2.27 The sample used to scale the grid-extension component made it possible to determine which projects would be economically and financially viable in the baseline scenario that describes the present situation, and in the various scenarios that will follow upon introduction of each procedural improvement adopted for the present program.[24]

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[24] For more details about the sample, the method and the results of the simulations conducted, please refer to the section titled "Financial Viability" in Chapter IV.

2.28 The analysis also made it possible to size the state subsidies that will have to be financed in order to make the economically viable projects achieve private rates of return that make them financially viable as well. The analysis also determined the total investment costs estimated for the sample projects that are economically acceptable, the investments that distribution companies will have to finance, and the contributions required from the final beneficiaries.

2.29 The self-generation projects were scaled using the unit costs calculated for each type of project (wind energy, micro-hydropower plants, photovoltaic panels, etc.), based on parameters extrapolated from the 12 sample projects evaluated (paragraph 4.12).

2.30 Finally, the institutional strengthening and training component and the item for program administration were scaled as a function of the staffing, studies and specialized consulting services needed, as determined by an institutional analysis of the various agencies that will participate in program execution (CNE, SUBDERE, UTER, etc).

2.31 Table II-1 shows the estimates of the program's total cost and the proposed loan, which would represent 70% of the program's total cost.

Table II-1
The Program's Costs (US$ millions)

Category	IDB	Local Contribution	Total	%
Program administration	**0.5**	**1.2**	**1.7**	**3.0%**
1. SUBDERE	0.1	0.3	0.4	0.7%
2. CNE	0.1	0.3	0.4	0.7%
3. UT/UTER	0.3	0.6	0.9	1.6%
Component: Government incentives for private investment in rural electrification	**38.1**	**9.6**	**47.7**	**83.4%**
1. Incentives to invest in grid extensions	24.0	8.3	32.3	56.5%
a. Electrification of localities	23.4	8.0	31.4	54.9%
b. Regularization of customers	0.6	0.3	0.9	1.6%
2. Incentives to invest in self-generation	14.1	1.3	15.4	26.9%
a. Self-generation systems	12.2	0.7	12.9	22.5%
b. Studies to support development of projects	1.9	0.6	2.5	4.4%
Component: Institutional strengthening, training and social marketing	**0.5**	**0.8**	**1.3**	**2.3%**
a. Technical, social and environmental consulting services	0.2	0.2	0.4	0.7%
b. Training in social and environmental issues	0.1	0.1	0.2	0.3%
c. Training in grids and self-generation	0.2	0.4	0.6	1.1%
d. Regional seminars	0.0	0.1	0.1	0.2%
Contingencies	**0.3**	**0.6**	**0.9**	**1.5%**
PROPEF	**0.2**	**0.0**	**0.2**	**0.3%**
Inspection and supervision	**0.4**	**0.0**	**0.4**	**0.7%**
Borrowing costs	**0.0**	**5.0**	**5.0**	**8.8%**
Program total	**40.0**	**17.2**	**57.2**	**100.0%**
%	70%	30%	100%	

III. PROGRAM EXECUTION

A. Borrower and executing agency

3.1 The borrower will be the Republic of Chile. The executing agency will be SUBDERE, with support from the CNE, through a technical support unit to be set up within the CNE (UTA-CNE) for the specific purpose of providing advisory services on technical, social and environmental aspects of the program.

3.2 SUBDERE will perform its assigned program functions through a national control unit (UCN) located in Santiago, and through regional control units (UCR) located in each of the regions.

B. The national public investment system

3.3 The proposed program will be carried out under the national public investment system (SNI), whose main objective is to select and realize the investments that yield the highest economic and social returns. To that end, the SNI orchestrates and regulates interactions between entities operating at the national, regional and municipal levels and covers all phases of the investment process, i.e., a project's growth cycle from identification to startup. The entities participating in the system, regulations and procedures, the information flow and the processing and approval deadlines are clearly defined, making the SNI a highly transparent, homogenous and predictable system. Within this framework, the Budget Office of the Ministry of Finance (DIPRES) and MIDEPLAN regulate and administer the SNI, applying it to all those public sector services, institutions and businesses that engage in public investment activity in the country.

3.4 MIDEPLAN operates and manages the SNI whose main objective is to support decision-making on allocation of investment resources at the various levels of government. To this end, it is supported by the Integrated Public Investment Projects Bank (BIP), a computerized data system on investment projects that includes public sector baseline studies, projects, and programs at the national, regional, provincial and community levels. One of the BIP's main features is that it is a single, decentralized, interactive database that all its users can access through workstations connected to the system.

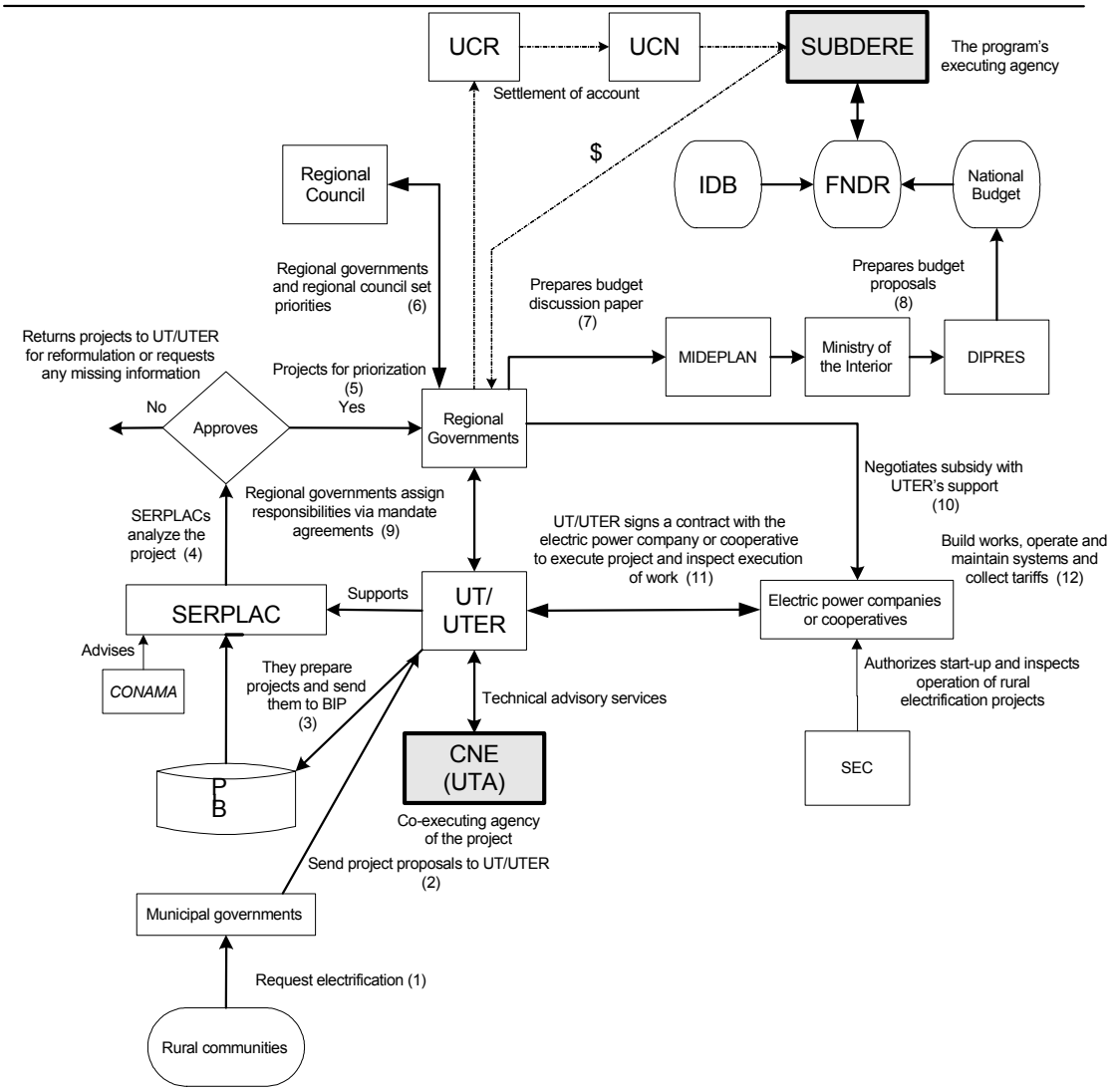
3.5 A technical-economic analysis subsystem also exists, called the basic investment statistics subsystem (SEBI), which has undergone a number of procedural and operational improvements over the course of several decades. The SEBI is a set of standards, instructions and procedures that enable institutions to have a portfolio of studies and projects that MIDEPLAN has recommended. The system has made an ex ante determination that those projects meet SEBI's technical, social, environmental and institutional requirements and, because their economic rate of

return is high, are ready to receive public funds for execution. The principal functions of this system are to standardize, regulate and coordinate the data on the process of identifying, presenting and evaluating investment projects to be funded with public contributions.

C. Program execution and administration

3.6 **The flow of program execution.** The project execution cycle can be summarized as follows: rural communities apply for electrification with their respective municipal governments (1); the municipal governments forward the proposals to the respective UT or UTER (2); with support from the UTA-CNE and in consultation with distribution companies, the UTs or UTERs prepare their projects and send them to the BIP (3); the SERPLACs analyze the projects in the BIP and either recommend their funding or return them to the UT or the UTER with observations for their reformulation (4); cleared projects are sent to the provincial governor to be prioritized (5); the list of projects, in order of priority, is sent to the regional council for ratification, which either clears or makes changes to the governor's proposal (6); once the regional council has approved or made changes to the prioritized list of projects, the governor prepares a budget discussion paper and sends it to MIDEPLAN (7); that paper is sent to the Ministry of the Interior for evaluation, and then to DIPRES for inclusion in the national budget (8); under the terms of a mandate agreement, the governor assigns the FNDR-funded PER projects to the UTs or UTERs (9); the provincial governors and distribution companies negotiate the amount of the subsidy to be assigned to the project, which must be under the ceiling set by MIDEPLAN (10); the UT or UTER signs a contract with the distribution company for transfer of the subsidies for execution of the electrification projects and inspects them (11); finally, the distribution companies execute the projects and, upon their completion, negotiate with the SEC for authorization to operate, maintain and administer those works, which includes collection of the rates approved for connected users (12). Table III-1 is a flow chart of program execution.

Table III.1
Rural Electrification Program
Flow Chart of Program Execution



3.7 **Strategic management**. Because multiple institutions are interacting within the PER and their coordination is essential to accomplishing the program's goals, an interministerial committee will be formed whose permanent members will be SUBDERE, CNE, MIDEPLAN and DIPRES.[25] When the characterization of a project is such that it must go through the country's environmental impact system, then CONAMA will also participate in committee meetings. The provincial governors participating in the program and the SEC will coordinate with the

[25] Although not yet officially established, the interministerial committee is already functioning.

committee and be invited to committee meetings as needed. The main purpose of the committee is to get government agencies to coordinate with each other, correct problems involving two or more government agencies, coordinate activities to settle any differences that may arise as a result of the program's execution, and advise the executing agency and co-executing agency on questions that come up in monitoring the projects' progress, coordination of joint activities, programming of resources, and review to check for accomplishment of goals. The committee will also promote meetings in the regions to keep the public and the various stakeholder groups informed of the PER's progress and take suggestions on how it might be improved. The formation of the interministerial committee is a **condition precedent to the first disbursement of funds.**

3.8 Through its national control unit (UCN) and regional control units (UCRs), SUBDERE will coordinate and manage administration and control of the program's finances, keep the accounting and financial records, prepare disbursement requests and the justifications of program-funded outlays, submit them to the Bank, and provide the Bank with any and all information needed to monitor and administer the loan contract. The accounting and financial records are to be kept in such a way that the sources and uses of program funds can be identified and are clearly distinguishable from the other funds that SUBDERE administers

3.9 Through its technical support unit (UTA-CNE), the CNE will coordinate all technical aspects, including social and environmental matters. It will assist the regional governments' technical units (which will be the UTERs in the regions where these units exist or will be created—regions IV, IX, X and XI) with the ex ante evaluation of the projects involving extension of grids, regularization of customers and self-generation. To do this, it will have professionals with experience in technical, social and environmental aspects, information sciences and other areas, and the necessary support staff. In cooperation with the UT or UTER, the UTA-CNE will advise the governors in their negotiations with the electric power companies or cooperatives that will execute the rural electrification projects, especially in connection with the value of the investment subsidy to be given to the private electric power distribution companies for each project. The UTA-CNE must be established as a **condition precedent to the first disbursement of the Bank loan**.

3.10 Under a mandate agreement, the regional governments will authorize their respective technical units to contract with the distribution companies for the rural residential electrification done by extending grids, and to call for proposals on the projects for electrification through self-generation and award the contracts to the electric power companies or cooperatives that will provide the service (paragraph 1.9(e)). Those technical units will monitor and control contract performance. As **a condition precedent to the first disbursement of the Bank loan,** SUBDERE, the CNE and the regional governments participating in the program must sign an agreement setting out the responsibilities of all three parties,

including responsibility for negotiating and/or contracting out the subsidies with the electric power distributors, suppliers or cooperatives and the model mandate agreement between the regional governments and the UTs or UTERs and the contract between the regional governments and the private companies.

3.11 **Institutional strengthening, training and social marketing**. To develop a database on market prices (efficient unit prices) for the inputs used by the private enterprises to implement the projects and efficient costs for operation and maintenance of the rural electrification systems, the UTA-CNE will need the support of a consulting firm to implement and maintain the database. With this information and the proposals put together by the companies—or cooperatives—and reviewed by the UTs or UTERs and the UTA-CNE, those units will help each regional government negotiate the subsidies (incentives) with the electric power companies or cooperatives. A database must be set up to support the CNE in setting efficient unit prices for rural electrification project inputs and efficient operation and maintenance costs for the rural electrification systems as a **condition precedent to the first disbursement of the loan proceeds earmarked for the component for government incentives for private investment in rural electrification.**

3.12 SUBDERE will be made stronger through its UCN and UCRs, which will be responsible for accounting and financial control of the program. Considering the UCRs' current staffing, the needs detected during the program's analysis and the volume of information that will have to be analyzed, the UCRs will need more professionals, computers, and office equipment. The program also includes funds to procure a financial-accounting system for the UCN and the UCRs.

3.13 The regional governments will be strengthened with the addition and training of professionals, technicians and support personnel in their respective UT or UTER. The UTA-CNE will provide the support needed to create and/or strengthen the UTs in those regions that will participate in the program but that do not currently have a UTER, form the UTER in region IV; and strengthen the UTERs that regions IX and X already have.

3.14 The regional planning and coordination secretariats (SERPLACs) will be strengthened with the instruction their sector specialists with receive in new techniques of analyzing rural electrification projects. MIDEPLAN will provide that training. Professionals from the UTA-CNE and from the UTs or UTERs with training in social and environmental matters will also assist the SERPLAC sectoral specialists with analysis and evaluation of the environmental impact briefs. (paragraph 3.32).

3.15 Presentation of the institutional strengthening, training, and promotion plan for the various entities involved in program execution is **a condition precedent to the first disbursement of funds.** In addition, establishment of the UTs or UTERs and

assignment of staff to operate them, and training of professionals in the UTs, UTERs, SERPLAC, the regional governments, and SUBDERE Regional Control Unit, and the community project managers from the respective regions in social and environmental topics, in accordance with the institutional strengthening, training, and promotion plan, will be **conditions precedent to the first disbursement of the loan proceeds earmarked for the component for government incentives for private investment in rural electrification for each of the regions participating in the program.**

3.16 **Operating Regulations.** The procedures for program execution and administration will take into account the recommendations resulting from the PROPEF-funded studies and from the workshops held during the operation's preparation, which were attended by the national and regional governmental institutions involved and the distribution companies or cooperatives. The program's Operating Regulations will make provision for the procedural and process changes to the method previously used, which are technical and operational improvements related to: (i) the program's new flow chart, including a description of the functions and responsibilities of the various institutions involved in program execution; (ii) the new method to be used to evaluate grid-extension and self-generation projects; (iii) the handling of social and environmental matters, taking into account the chief recommendations made in the social and environmental consulting report, which CONAMA made available to the public; (iv) the mechanisms for transferring funds; (v) the mechanisms for cooperating with other public utilities; (vi) categories eligible for program financing within each component, and (vii) identification of the basic rate schedules and management systems that will be used in the self-generation projects, including model contracts that take those factors into account. The Operating Regulations must be in effect as **a condition precedent to the first disbursement of funds.** In addition, as a **special contractual condition, any change in the Operating Regulations will require the written consent of both the Bank and the borrower**.

3.17 **The communities**. For every project conducted under the program, a relationship of trust must be built between the project's sponsor (SUBDERE, UTA-CNE, and UT or UTER) and the beneficiary communities. According to the promotion strategy set forth in the institutional strengthening, training, and promotion plan for the various parties involved in program execution, the communities will have to be apprised of all the advantages and disadvantages of each system and of the costs of the in-house installations, meters and couplings with the grid, which they would have to pay for, and ways to save on and finance those costs (paragraph 3.33).

3.18 **Eligibility of and contracting for the grid-extension projects.** The eligibility of the projects will be determined according to the project evaluation method established by MIDEPLAN-CNE (paragraph 1.9). The grid-extension projects to be executed starting in 2004 will feature the improvements suggested by PROPEF: (i) a 30-year project evaluation horizon; (ii) use of minimum technical

specifications for purposes of computing the project's cost and the subsidies to be given; (iii) use of new demand curves specific to the various regions taking part in the program; (iv) effective inclusion of demands for productive uses when computing the projects' future income; and (v) adjustments to the formula used to figure distribution losses that are technical in nature.

3.19 In projects where retroactive financing can be recognized, as indicated in paragraph 3.30, and those to be carried out and financed in 2003 -the year when the transition is made to the PER's new evaluation method-, program-eligible projects will be those in which the negotiations between the regional governments and the distribution companies are conducted on the basis of the maximum allowable subsidy once the updated demand curves and potential savings from using least-cost posts in the projects' design are factored in.

3.20 Following the system of administrative decentralization in the country today, the regional governments will continue to let the contracts for grid-extension projects. The regional governments will be built up and have advisory services so that they are able to meet their information needs and operate on a more equal technical footing with the energy distribution companies and cooperatives with which they must negotiate and set the state subsidies to investment.

3.21 Two types of state subsidies will be given: locality-electrification subsidies, and customer-regularization subsidies. The first will be negotiated as a fixed lump sum for electrification of each locality. The maximum amount will be determined by the negative PNPV, as explained in paragraph 1.9. In cases where the companies and cooperatives might compete for the concession, that competition will be encouraged and taken into consideration when negotiating the amount of the subsidy.

3.22 The maximum state subsidy for electrification of each locality will be calculated by the UT or UTER, with advisory assistance from the UTA-CNE, and approved by MIDEPLAN's SERPLAC during the project's evaluation. This procedure is being used because competitive mechanisms are impractical; with so few companies or cooperatives interested in bringing electricity service to each locality, competition might result in monopolistic or oligopolistic bids and price distortions caused by the fact that these markets are imperfect by nature.

3.23 Because the maximum state subsidy allowed is determined by quantities of work and efficient prices based on minimum technical specifications, and given the fact that the distribution companies or companies are free to build their grids to technical specifications higher than those used to figure the maximum subsidy, it is neither feasible nor advisable for government agencies to demand plans, topologies or specific technical features in the distribution grids that the distribution companies will build. Nor does it make sense to require private stakeholders to meet specified procurement and contracting requirements when building their grids. In the final analysis, these companies are responsible for procuring the goods and services and

executing the projects, and hence run all the risks associated with the final costs of investing in, operating and maintaining the projects that they build, and remain responsible for providing the service according to the regulations in force in the country.

3.24 Thus, the distribution company or cooperative that wins the concession for each new locality to be served must, in exchange for the subsidy received, undertake a contractual obligation to operate and maintain the electricity distribution system for the life of the concession, to comply with the established technical standards and to collect the tariff in force. In building the distribution works, the companies may deviate from the optimal plan or from the established technical standards, provided the specifications for the changes they introduce are higher than the minimum allowed and provided the companies cover any cost overruns incurred and connect all existing potential customers that the locality-electrification project was intended to serve. Therefore, as noted in paragraph (paragraph 3.10), one function of the UTs or UTERs will be to verify that contractual clauses are being honored, including, among others, the established minimum specifications, the connection of existing end customers that make each locality's electrification economically justifiable, and the other contractual terms such as guarantees, disbursements and execution times.

3.25 Finally, in the case of customer regularization projects, the State subsidy will be granted in a standard amount per end customer hooked up. The maximum amount of the subsidy will be calculated according to the evaluation criteria agreed upon by MIDEPLAN and the CNE, as noted in paragraph 2.11.

3.26 **Eligibility of and contracting for the self-generation projects.** In the case of the self-generation projects to either increase coverage or improve the existing power supply, MIDEPLAN's basic investment statistics system (SEBI) will include a rule requiring that self-generation projects have the CNE's technical clearance before being submitted for final evaluation. The only eligible projects will be those already cleared by the UTA-CNE and that require projects to have adequate mechanisms to ensure sustainable service for the duration of their useful life (see paragraph 2.15).

3.27 Unlike with grid-extension projects, investment costs of self-generation projects can be determined using procedures that get market actors to compete. Economies of scale, scope, customer captivity, and restrictions on players moving in and out of the market freely are all factors that have to be considered when electricity is distributed over grids; not so with self-generation systems. However, as in the case of the grid-extension projects, the maximum amount of the subsidy will be determined by the project's PNPV, calculated by the MIDEPLAN-approved method for self-generation projects, with the new procedural improvements included. The location of the users and the energy resources available for self-generation (sun, wind, water, etc.) are identified in the preliminary version of the project or its initial formulation. Using that data, a prefeasibility evaluation is done showing whether the project is possible and whether it represents the least-cost

solution. Those studies will be done by the UTA-CNE, with assistance from the UTs or UTERs and municipalities. The technical feasibility study, which will feature, *inter alia,* the design and engineering of the project, must be outsourced to a private firm of recognized expertise. Lastly, MIDEPLAN's SERPLACs will review the economic evaluations of the projects.

D. Procurement of goods and services

3.28 Contracts for consulting services and the procurement of goods will be done in accordance with Bank policy and procedure on the subject: (i) contracts for consulting services whose cost exceeds the threshold of US$200,000 will be awarded on the basis of international competitive bidding (ICB); (ii) the procurement of goods will be done by ICB when the amounts involved are equal to or higher than US$300,000. Annex II contains the procurement plan. Price may be used as one of the criteria used to select service providers, in accordance with document GN-1679-3.[26] When the selection of service providers is based on a combination of price and quality, price will not be assigned a weighting of more than 30% as a selection factor.

3.29 Because the program will not be financing works, but instead financing incentives (mainly subsidies) set ex ante to induce private distribution companies to invest in rural electrification in the areas determined to be priorities, program execution and administration does not include provisions on bidding related to the construction, operation or maintenance of works. However, contracts entered into with the companies that will build the grid-extension and self-generation projects will have to include the following clauses: (i) a commitment that the goods and services procured with subsidy funds will be used exclusively for those projects; (ii) an obligation on the part of the distributors, suppliers, or cooperatives to comply with the environmental protection measures that the environmental management plan (EMP) provide for; (iii) the right of SUBDERE, the CNE and the Bank, as well as the private firm of independent auditors, to examine the respective projects' goods, sites, works and construction work; (iv) an obligation on the part of the distributors, suppliers, or cooperatives to provide any information that the SUBDERE, the CNE, the Bank, the Office of the Comptroller General, or the private independent auditing firm may request in connection with the project, as appropriate: (a) certification of the country of origin of the goods and services procured for the project; and (b) the cost of the goods and services procured from Bank member countries and the percentage of the project's total cost that the cost of those goods and services represents; (v) the obligation on the part of the distributors, suppliers or cooperatives to deliver, prior to provisional receipt of the projects from the regional governments, a list of the customers who have been connected to the grid or system for self-generation under the project, signed by authorized representatives of the company and of the corresponding UT or UTER; (vi) an obligation on the

[26] Bank policy for contracting of consulting services.

part of the distributors, suppliers or cooperatives upon receiving the subsidy to submit bank guarantees acceptable to the borrower and the Bank for advance payment of the subsidy for the respective project and for full compliance with the contract; (vii) an obligation, on the part of the distributors, suppliers or cooperatives, upon provisional receipt of the respective project, to submit a guarantee that the project will be properly executed and superseding the guarantee referred to in subparagraph (vi) above; and (viii) in the case of self-generation projects, a system that will enable the regional governments to assign the respective equipment and systems, along with responsibility for service delivery, to another supplier, through a new call for bids, should the service provider permanently cut off the service contracted for or should that service fail to measure up to the minimum quality standards specified in the contract. Presentation of model contracts between the regional governments and the private sector for the grid-extension and self-generation projects, with the clauses recommended by the Bank included, will be a **condition precedent to the first disbursement of the Bank loan.**

3.30 The Bank will recognize expenditures made since 30 November 2002, the date of the program analysis mission, up to the equivalent of US$8 million against the local counterpart, and up to another US$2 million as retroactive financing to be paid from the loan. Recognition of expenditures will be allowed provided that requirements substantially similar to those established under the proposed program have been met. For purposes of replenishing the revolving fund, the only payments that will be recognized will be those for government subsidies transferred to the power companies once they have completed the respective projects, the necessary connections have been made as planned in the respective contracts, and the regional governments have officially accepted the projects. A revolving fund in the amount of up to 10% of the loan amount was therefore deemed necessary.

E. Environmental issues

3.31 The program incorporates measures for prevention, mitigation, reparation and compensation of any environmental impacts that the program's activities might cause (paragraph 4.18). These measures are embodied in an environmental management plan (EMP), which will figure in all contracts for projects to be carried out by the private sector. The EMP contains measures to control the direct impacts identified, based on Chilean environmental legislation, which measures will be taken depending on the nature of the projects. They include the following: (i) control of atmospheric emissions and air quality; (ii) noise control; (iii) management and disposal of liquid and solid, industrial and domestic waste; (iv) handling and storage of liquid fuels; (v) conveyance of materials; (vi) protection of riverbeds, rights of way and waterways; (vii) protection of the landscape; (viii) protection of fauna, flora and vegetation; (ix) protection of the cultural heritage; (x) health, workplace hygiene and safety; and (xi) soil protection. It must also take the current land-use system into account, making sure that each

electric power generation and transmission facility is built in a sector allowed under any communal or sectional master plan that may exist (paragraph 4.19).

3.32 The program includes an environmental brief, which MIDEPLAN will require as additional background for every project applying for PER funding. The brief's objectives will be to: (i) ensure that the social and environmental aspects of every project are covered in its eligibility analysis; and (ii) provide the information needed to determine what environmental measures have to be taken during implementation of projects.

3.33 The program encourages the participation of indigenous and *campesino* communities. It will strengthen the various institutions involved (paragraphs 3.17, 4.4, 4.5 and 4.19) and provide their staff that will be involved in evaluating, recording, supervising and monitoring the program's projects with instruction in social and environmental topics.

F. Status of the conditions precedent to the first disbursement

3.34 During the program negotiations, the borrower advised the Bank that all the special conditions precedent to the first disbursement of the prospective loan are at an advanced stage of fulfillment. Accordingly, no difficulties or delays are expected in achieving eligibility for disbursement for the proposed operation.

G. Execution period and disbursements timetable

3.35 The time period planned for the PER's physical execution spans the 2002-2006 horizon. The loan-disbursement period will be a minimum of 36 months but no more than 48 months, while the maximum period for commitment of loan funds will be 42 months from the effective date of the loan contract. Expenditures made since November 2002 to engage consulting services to complete program preparation and consolidate the component for institutional strengthening and training will be recognized, provided they fully comply with the service-contracting clauses.

3.36 Table III-2 is a preliminary estimate of the Bank's disbursements for the 2003-2006 period.

Table III-2
Disbursement Timetable
(US$ millions)

Category	2003	2004	2005	2006	TOTAL
Administration of the program	**0.125**	**0.125**	**0.125**	**0.125**	**0.500**
1. SUBDERE	0.030	0.030	0.030	0.030	0.120
2. CNE	0.030	0.030	0.030	0.030	0.120
3. UT/UTER	0.065	0.065	0.065	0.065	0.260
Component: Government incentives for private investment in rural electrification	**8.000**	**11.100**	**11.000**	**8.000**	**38.100**
1. **Incentives to invest in grid extension**	**5.000**	**7.000**	**7.000**	**5.000**	**24.000**
a. Electrification of localities	4.850	6.850	6.850	4.850	23.400
b. Regularization of customers	0.150	0.150	0.150	0.150	0.600
2. **Incentives to investment in self-generation**	**3.000**	**4.100**	**4.000**	**3.000**	**14.100**
a. Self-generation systems	2.550	3.600	3.500	2.550	12.200
b. Studies to support project development	0.450	0.500	0.500	0.450	1.900
Component for institutional strengthening, training and social marketing.	**0.300**	**0.100**	**0.050**	**0.050**	**0.500**
a. Technical, social and environmental consulting services	0.100	0.050	0.025	0.025	0.200
b. Training in social and environmental issues	0.100	-	-	-	0.100
c. Training in grids and self-generation	0.100	0.050	0.025	0.025	0.200
d. Regional seminars	-	-	-	-	0.000
Contingencies	**-**	**-**	**-**	**0.300**	**0.300**
PROPEF	**0.200**	**-**	**-**	**-**	**0.200**
Inspection and supervision	**0.400**	**-**	**-**	**-**	**0.400**
Total for the program	**9.025**	**11.325**	**11.175**	**8.475**	**40.000**
%	22.6	28.4	28.0	21.0	100.0

H. Control of program resources

3.37 The loan proceeds will be deposited in a dollar-denominated current account maintained by the Treasury (TGR) in the Central Bank of Chile. The TGR will transfer the equivalent amount in Chilean pesos to a current account maintained by SUBDERE in the Banco del Estado. In its chart of accounts, SUBDERE will establish auxiliary accounts to separate the use and flow of the loan proceeds and the local counterpart funding for accounting purposes (which will be a condition precedent to the first disbursement according to the General Conditions). SUBDERE will transfer the funds to the current accounts maintained by the regional governments in Banco del Estado, pursuant to requests for payment from the regional governments.

3.38 In its chart of accounts, each regional government will establish auxiliary accounts to separate the use and flow of the loan proceeds and the local counterpart funding for accounting purposes. The regional governments will forward detailed

information to the national coordinator (SUBDERE) on the status of the accounts and the resources. Records on the application of the funds must be duly kept for review by the Bank and the Office of the Comptroller General. The chart of accounts must be established in each regional government, as indicated above, as a **condition precedent to the first disbursement of the loan proceeds earmarked for the component for government incentives for private investment in rural electrification for each of the regions participating in the program**.

3.39 The financial reports, including information on the application of the resources from the revolving fund, must include financial and accounting information on the status of the resources and the auxiliary accounts for the loan proceeds and the counterpart funding, both at the regional government level and in SUBDERE.

I. Monitoring and evaluation

3.40 The Bank's country office in Chile will oversee the program. Annual administration and monitoring meetings with the project team are also planned.

3.41 Those meetings will: (i) examine the progress on the annual investment plan; (ii) review realization of the goals, objectives, indicators and assumptions in the logical framework (Annex I) and any developments related to the risks identified; (iii) agree upon the investment plan for the following year, specifying the goals to be accomplished and any corrective measures that may be needed.

3.42 In preparation for those meetings, the executing agency pledges to submit to the Bank, at least 15 working days before each meeting, a report on the program's progress, fulfillment of contractual obligations and the progress made toward realization of the indicators, goals and assumptions presented in the program's logical framework (Annex I), and any developments a propos the risks identified in the program. The co-executing agency will present a technical report on the PER's historical development and its recommendation on the investments planned for the following year. Should the Bank find any problems with the program's execution, the executing agency will be required to submit proposed corrective measures to the Bank and specify when those correctives will be introduced.

3.43 **Financial and operational auditing**. The program's financial statements must be submitted to the Bank on an annual basis, within the 120 days following the close of the executing agency's fiscal year, for the duration of the program's execution. Those statements are to be audited by the Office of the Comptroller General of the Republic of Chile. Every year, the borrower must submit an operational audit of the grid extension and self-generation projects, to be conducted by sampling by an independent private firm acceptable to the Bank, together with the financial statements of the program (paragraph 3.29).

J. Ex post evaluation

3.44 In keeping with Bank policy, once the respective inquiries had been made with the executing agency, the authorities reported that because detailed annual reports will be prepared on the program's progress and goals, no program-funded ex post evaluation is considered necessary.

3.45 On the other hand, as explained in other sections of this proposal (paragraphs 1.15 to 1.20 and 4.18 to 4.26), while the proposed program was being prepared, PROPEF funded a series of studies and workshops conducted with the major stakeholders involved, so that the principal lessons learned from the country's extensive experience with rural electrification projects, including their social and environmental impacts, could be built into the present operation's overall design and into the formulation of the individual grid-extension and self-generation projects. Also, during the program's first year, funds for the self-generation component will be used to do an ex post evaluation of self-generation projects conducted in the past in Chile (paragraph 2.17), to supplement the findings of the studies being funded by the GEF on removing barriers to rural electrification through the use of renewable energy (paragraphs 1.25 and 4.37) and to include in the design of future self-generation projects the lessons learned from similar projects conducted in the past. Given all this, the project team believes that a Bank-funded ex post evaluation would not be justified, as such an evaluation is unlikely to produce any meaningful additional information beyond that either already available or that will become available by the time program execution is completed.

IV. VIABILITY AND RISKS

A. Technical viability

4.1 Load projections indicate that by 2010, consumers connected under the program's grid-extension component would add 14.4 MW and approximately 32.4 GWh of annual consumption to the national electric power system. That increase in generation demand to cover the additional needs for rural electrification is very small by comparison to the fully electrified urban areas and represents barely 0.1% of the SIC's current total consumption, and 1.5% of the increase in demand observed in 2002. It is important to note that between 1996 and 1998 close to 20,000 new rural hook-ups were added per year. The conclusion is, then, that both in terms of generation capacity and physical execution, the 28,300 new connections to increase coverage through grid-extension projects are technically feasible in those now unserved areas where the proposed program will be implemented. As for the self-generation component, the generation technologies (diesel generators, wind turbines, solar panels and micro-hydro facilities) are familiar and already in use in the country. Resources are planned for conducting technical feasibility studies before calling for proposals on the various self-generation projects to be built.

4.2 The program also introduces a number of improvements over earlier stages of the PER. These include acceptance of specifications that, while modest, are sufficient to comply with the service quality standards, and acceptance of efficient costs based on technical studies done for each grid-extension and self-generation project to be included in the program. To ensure that efficient prices are calculated in the ex ante evaluation of eligible projects, a consulting firm will be engaged to help the CNE improve the economic and financial aspects (unit prices of inputs, labor costs, determination of efficient operating and maintenance costs, and so on) to be included in the projects' design.

B. Institutional viability

4.3 The plan proposed for program execution takes into account the successful experience of earlier stages of the PER as well as the improvements needed to deal with some of the problem areas identified in the government agencies involved and in the investment management and control procedures.

4.4 Under the components for institutional strengthening and administration, steps will be taken to establish a rural electrification technical unit (UTER) in region IV and build up the technical capacity of the UTERs in regions IX and X; strengthen the technical capacity of the technical units (UTs) in the other regions where the program will be implemented; increase the management, monitoring and control capacity of SUBDERE as executing agency; strengthen the CNE by creating a specialized technical unit (UTA-CNE) staffed with additional professional

personnel with experience in rural electrification and self-generation projects; and instruct the manager of that technical unit in social and environmental issues so that said manager is then able to advise the UTs or UTERs and monitor compliance with environmental specifications during execution of the projects. Specialized consulting services will also be engaged.

4.5 In order to be able to coordinate the activities that involve the multiple government agencies participating in the program, whether directly or indirectly, an interministerial committee will be established whose permanent members will be SUBDERE, the CNE, MIDEPLAN and DIPRES. Particular care will be taken during program execution to ensure that the beneficiary communities effectively participate in all stages involved in identifying, developing and executing the projects. Citizen participation is expected to figure prominently among the community-outreach measures that the program will feature.

C. Socioeconomic viability

1. Willingness to pay

4.6 The surveys and analyses done by MIDEPLAN to find and update information on the residential electricity demand curves in rural parts of the regions in which the program will be conducted indicate that, in general, those rural families in Chile that do not now have electric service are willing to pay to cover the monthly costs that connection to the electric power systems will involve,[27] as the use of substitute energy sources like candles, kerosene, deep-cycle batteries, batteries and the like are a significantly greater monthly expense for these poor families.[28] Thus, among these consumers, there is a marked preference for electric power and considerable willingness to pay the full tariffs now being charged for electric power service in Chile's rural zones. Further evidence is that in earlier stages of the PER, potential beneficiaries generally were willing to make the bank deposits required to cover the costs of the residential hook-ups and that in the rural electrification projects that the PER has conducted in the last ten years, billings were paid on a regular basis.

2. Socioeconomic viability of the grid-extension subcomponent

4.7 **Representative sample and economic-financial simulation model.** The analysis of the socioeconomic viability of the PER grid-extension subcomponent was done using the data available in the program's data bank, which included technically mature projects that had already been evaluated and had been fed into the BIP, and a simulation model especially designed to measure their economic and financial

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[27] These payments would represent, on average, between 1.8% and 2.5% of the beneficiary families' monthly income.

[28] The expenditures on substitute energy products would be, on average, 3 to 5 times the tariff for 30-50 KWh/month.

impact. The adapted data bank used in the simulations covers a representative sample of 524 projects involving a total of 16,653 residences. This represents over 63% of the anticipated universe of beneficiaries in new localities to be electrified, estimated at 26,277 residences. With the method that MIDEPLAN developed for evaluating rural electrification projects (paragraphs 1.9 and 3.3 to 3.5), the computerized simulation model can figure the net flows from each project in the sample, its net present value (NPV), and its social and private internal return rates. The variables used included: the population growth rate in the zones where the program will be implemented; the number of potential beneficiaries, discriminated according to the socioeconomic levels in the CAS classification categories, and the estimated demand per income level with and without project, in each region for the duration of the simulation; the rates at which distribution companies sell to users; the purchase price of the electric power at each "node"; electricity losses estimated on the basis of the average distances from the localities to be electrified to the purchase "nodes"; the costs of medium- and low-tension cables, etc**.**

4.8 The simulations conducted identified which projects would be economically and financially viable, the corresponding number of beneficiary residences, total investment costs, state subsidy levels and the contributions from the distribution companies, as well as the social NPV for both the baseline scenario and each of the various scenarios resulting from the various procedural and technical improvements to be introduced with this new stage of the PER.

4.9 **Results of the simulations, least-cost analysis, and impact of the proposed improvements.** The various improvements proposed by the PROPEF-funded studies ensure that the electrification will be done at the minimum total economic cost. In effect, the global impact of the combination of improvements lowers the per-customer investment cost from US$1,915/residence before the proposed improvements, to US$1,567/residence once the improvements are introduced. In other words, the unit investment costs are more than 18% lower. Similarly, the state subsidies required drop from US$1,386/residence to US$1,206/residence, or US$180 per customer. The US$348/residence decrease in the unit investment cost represents a savings of US$9.1 million in the total costs of the needed investments:[29] US$4.7 million less in state subsidies and US$4.4 million less in the companies' input.

4.10 **Benefit-cost analysis.**[30] The benefit-cost analysis of the admissible projects in the representative sample indicates that their economic internal rate of return (EIRR)

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[29] For that calculation, the assumption was that a total of 26,277 residences will be electrified by extending grids into new localities. Another 2,034 residences will be electrified under the program to regularize customers within area serviced by the grid, for an estimated total of 28,311 residences to be electrified under the projects included in this subcomponent.

[30] This section briefly summarizes the main findings of the economic analysis of the program. The details of that evaluation are available in the FI1 technical files.

rises to 27.7%[31] and their social net present value (SNPV) to US$38.7 million.[32] Using the eligibility criteria established in the MIDEPLAN method, all the admissible projects in the universe to be electrified yield an EIRR of over 10%.[33]

4.11 Table IV-1 illustrates the chief findings of the sensitivity analysis done on the representative sample for the program's grid-extension subcomponent. In all simulated scenarios, the average EIRR of the admissible projects remains above 20%. The simulations demonstrate that the program is robust, as the indicators of economic advantage remain high even assuming significant changes in the determinant variables, as summarized in the table below.

Table IV-1
Sensitivity Analysis of the Sample of Grid Extension Projects
Monetary values expressed in US$ millions

DESCRIPTION	Number of residences	Total invest-ment	State Subsidy	Companies' input	Customer input	Social NPV
BASELINE SCENARIO	16,653	26.1	20.1	1.3	4.7	38.7
1. The total investment cost increases						
a. By 10%	16,487	28.0	21.7	1.1	5.2	36.0
b. By 20%	16,176	29.5	22.9	1.0	5.5	33.3
2. The cost of electricity and the tariff drop 15%	16,653	26.1	20.3	1.0	4.7	37.5
3. Demand drops 15%	16,487	25.5	20.1	0.7	4.7	33.7

3. Socioeconomic viability of the self-generation subcomponent

4.12 **Indicative sampling.** Despite an inventory of 23 self-generation projects covering a total of 8,829 residents, the data on these projects is frequently incomplete and the projects themselves have not yet been officially added to the BIP. Their formulation is at differing stages of maturation. Out of these self-generation projects, a sample of 12 was evaluated in detail. They are located in the various regions that the program will target, and cover a total of 7,339 residences (i.e., almost 90% of the total number of residences proposed as the goal for this program subcomponent). For the projects in this sample, estimates were made of the impact that minimizing

[31] The data used for the economic evaluation correspond to the currently portfolio of available projects in the PER; the unit prices considered in the representative sample are observed values that, in general, are higher than the minimum costs to be introduced with the procedural improvements in this new stage of the program. Consequently, the economic indicators estimated for the representative sample assume a conservative scenario.

[32] Calculation made at a social discount rate of 12%. By way of illustration, extrapolating this result to the universe of localities to be electrified under the program yields an SNPV of US$61 million.

[33] For the acceptable projects in the representative sample analyzed, the EIRR varies between a minimum of 12.5% and a maximum of 83.5%.

the cost would have on the total investment, and the state subsidies that would result when the various proposed procedural improvements are introduced.

4.13 **Impact of proposed improvements.** In the case of the self-generation projects, the total cost of the projects in the indicative sample (not including the proposed improvements) would rise to US$2,332/customer. The global impact of the proposed and simulated improvements would reduce the unit investment cost by almost 10%, which would bring that cost down as low as US$2,099/customer. This is achieved mainly by using efficient standards and technical specifications when formulating the electric mini-grid self-generation projects through micro-hydro facilities or wind/diesel energy combinations. In the case of the state subsidies, estimates are that the improvements will lower them from US$1,798/customer to US$1,544/customer, i.e., a drop of 14.1%.

4.14 The US$233 decline in the unit investment cost per electrified residence and of US$254/residence in the value of the state subsidy would mean an added savings of US$1.9 million in the subcomponent's investment cost, and US$2.1 million less in the state subsidies required.

D. Financial viability

4.15 As in the earlier stages of the PER, all investments in the grid-extension projects will be made by the private companies or electric power cooperatives in the three regions where the program will focus. Those companies will participate in the program if the projects are able to produce a financial return for private business. Following the method established by MIDEPLAN, the program's design makes provision for payment of a state subsidy that covers a portion of the initial investment costs. That subsidy is calculated so that the private return rate pre-project is at least 10% of the amount of the private investment, once net revenues from tariffs for the life of the projects are factored in (paragraph 1.9). Also, the residential hook-up and installation costs under the PER are to be paid in full by the program's individual beneficiaries.[34] Estimates are that the resources to be contributed by the electric energy companies and cooperatives represent 9.5% of the total anticipated investment cost[35] and those from beneficiaries 15.2%; these figures are similar to those of the PER's earlier stages and have proven to be financially feasible.

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[34] In some localities, the municipalities make certain that these contributions will be made by special opening bank accounts into which future beneficiaries of the PER projects can make their monetary contributions, until they cover the required amount. In other cases, the distribution companies themselves finance the cost of the residential hook-ups, and then recoup those costs through monthly payments added to the beneficiaries' electric bill.

[35] The program's total investment in rural electrification is estimated at US$59.9 million, which includes US$5.7 million in contributions from companies and US$9.1 million from end beneficiaries.

4.16 While the self-generation projects can also be executed and/or managed through NGOs, in combination with users, etc., in these cases the investment subsidies are allocated competitively. As in the case of the grid-extension projects, under Chilean law the tariffs charged the beneficiaries must cover all costs of operating and maintaining the systems. And so the municipal governments and the energy service providers reach tariff agreements with the administrators that ensure the systems' financial sustainability.

4.17 Finally, the Government of Chile, by way of the Finance Ministry's DIPRES, has pledged to match the Bank's funds promptly. The counterpart funds will come from the nation's regular budget to ensure that the program is carried out on schedule and so that the rural electrification goals proposed by the present Administration can be achieved.

E. Environmental and social viability

4.18 Chile has a modern body of environmental law that is part of the national investment system and therefore applied to every project funded. The foregoing notwithstanding, the strategic environmental assessment (SEA) of the program found certain weaknesses in social and environmental management and designed the proper supplementary and/or corrective measures. The latter meet the Bank's social and environmental requirements. The following were prepared: (i) an environmental management plan (EMP), with the project specifications that will be included in the bidding documents and/or the works contracts so as to prevent and mitigate any impacts they might have (paragraph 3.31); (ii) a proposal for social and environmental institutional strengthening and training measures needed to make possible control and monitoring of program implementation at each of the institutions involved (paragraphs 3.9, 3.13 to 3.15, and 4.4); and (iii) a survey and study of the socioeconomic, ethnic, and cultural profile of the rural population directly benefited by the electrification projects, and public consultations with the population involved, to determine what their expectations of the program are, and any conflicts and difficulties they have with it (paragraphs 3.33, 4.22 and 4.25).

4.19 A set of institutional mechanisms is planned for the program to implement environmental-impact mitigation measures and make provision for adequate social and environmental management. The measures planned to reinforce the environmental management capability of the CNE and the regional governments (paragraphs 3.9, 3.13 and 3.15), and the environmental specifications (EMP) to be included in the bidding documents and/or contracts for project execution, will make it possible to keep constant track of any social and environmental issues that come up with the various phases and modalities of the rural electrification projects in the program (paragraph 3.31).

4.20 The program's social and environmental management measures were properly itemized and budgeted in the SEA; the funds for their execution were included in

the program's budget (paragraphs 2.19 to 2.22, 2.24 and 2.31, Table II.1); and their period of execution is compatible with the project execution schedule. The environmental management measures figure in the environmental management plans (EMPs) of the rural electrification projects that the electric power companies will carry out.

4.21 The evaluation of the previous loan concluded that: (i) the most significant aspect observed was the improved quality of life in the electrified communities (paragraph 1.20); and (ii) the self-generation projects executed had a low rate of sustainability, pointing up the need to correct the Operating Regulations and take steps to ensure that this type of energy generation is properly marketed (paragraphs 1.20, 2.15 to 2.18 and 3.26). This problem is one that the present program addresses (paragraphs 2.15 to 2.18, 3.26 and 4.38).

4.22 The SEA concluded that no cumulative impacts are expected from the PER's actions. The anthropological study conducted during preparation of the proposed operation did not identify any special support needs that the indigenous communities located within the regions that the program will serve would require; nor did it find that consumption subsidies or social marketing on a scale larger than that already planned would be needed (paragraph 4.18) for indigenous and campesino communities. The reasons include the following: (i) the expenses that these communities will incur to pay the electricity tariffs will be less than what they are paying at the present time without the program; and (ii) for these communities this program is a basic aspiration.

4.23 The study done of the relations between the indigenous communities and the municipalities found that the larger the ethnic presence, the stronger those relations are. The social marketing measures proposed under the program will help build trust between the communities and the local governments, thereby increasing the indigenous communities' involvement in program design and implementation and generating positive interrelations among the community, the local governments and other public sector entities (paragraphs 3.17, 3.33, 4.19 and 4.22).

4.24 Attentive to the Bank's environmental policies, the following are some of the changes that the SEA recommends in the proposed program: (i) including the environmental brief to parallel enumeration of the basic statistical data brief; (ii) providing social and environmental institutional strengthening and training to institutions involved in the program, and (iii) concentrating the funds in the three regions of the country where rates of rural electrification coverage are lowest.[36]

4.25 The results of the public meetings held in communities benefited by the program appear in the Strategic Environmental Assessment of the program and reflect their

[36] Regions IV, IX and X would absorb 87.4% of the funds to be earmarked to stimulate investment in rural electrification (US$41.7 million out of a total of US$47.7 million) during program execution.

desire to participate (paragraphs 3.33 and 4.18). That report was made available for public viewing at CONAMA's 13 regional directorates. The public had from 5 September to 6 October 2002 to submit any comments they might have. Before the strategic environmental assessment was made available for public viewing, a notice was placed in the press announcing the places, dates and times the document could be viewed.

4.26 The strategy described here will ensure that the projects supported by the program are socially and environmentally feasible and that the necessary protective measures are taken when potential negative environmental impacts are identified.

4.27 To ensure that the planned environmental measures are properly implemented, it is recommended that the loan contract include the following clauses:

a. **Conditions precedent to the first disbursement for the program,** the executing agency is to submit evidence to the Bank showing that the social and environmental institutional strengthening of the UTA-CNE was carried out, i.e., that the social and environmental training was done;

b. **Conditions precedent to the first disbursement** for projects in each region, the executing agency is to present evidence showing that: (i) the UT or UTER professionals who will monitor and ensure compliance with the social and environmental safety measures provided for in the design and execution of PER projects were hired or received social and environmental training; and (ii) the UT, UTER, and SERPLAC professionals, managers of community and company projects, and professionals from the regional government analysis and management division and from the Under Secretariat for Regional and Administrative Development with administrative responsibility over the program were trained in social and environmental issues.

c. Each UT or UTER is to submit six-month reports to the Bank describing the environmental measures taken and the results obtained, any problems that result and the corrective measures taken to solve them. **As a contractual condition for the program, three years after the effective date of the loan contract,** the executing agency will submit a report containing the results of the social and environmental measures implemented under the program.

F. Social equity and poverty targeting

4.28 As mentioned previously (paragraph 1.11 and 1.12), 88% of the coverage shortfall is in the most rural areas of the three regions with the lowest coverage rates nationwide (regions IV, IX and X).[37]

[37] Currently, the rural electrification coverage rates in those regions are: IV: 79%; IX: 76%; and X: 79%.

4.29 The regions at which the bulk of the proposed program's investments will be targeted are not just those where rural electrification coverage is farthest from the 90% that the government is committed to achieving, but also those where the poverty rates are highest, the indices of human development are lowest and that feature large indigenous populations and hinterlands that cannot be reached by building out grids.

4.30 According to the most recent National Socio-economic Survey (CASEN) from December 2000, 72.7% of the rural population that does not now have electric power service is in the lowest two quintiles of rural income distribution, and 49.5% belong to the poorest 20% of the population in those regions. For these reasons, and because the program will focus its investment, training and dissemination efforts precisely at the most remote and poorest zones in these regions, where the energy supply deficit is greatest, the present operation is regarded as a social equity (SEQ) enhancing project, as described in the key objectives of the Bank's activities contained in the report on the Eighth General Replenishment (document AB-1704). Moreover, based on the geographic criterion, it also qualifies as a poverty-targeted investment (PTI).

G. Benefits

4.31 The proposed program will be instrumental in achieving the Chilean government's goal of at least 90% electrification coverage in the rural zones of each of the country's 13 regions by late 2006. To do this, the incentives to private investment in rural electrification in the deficit zones are expected to induce the distribution companies to connect almost 29,000 families to their grids, and to either supply or improve the supply of electric power through self-generation projects and local mini-grids that emphasize the use of renewable sources of energy to around 8,300 families in isolated rural areas, where extension of the distribution grids is neither technically nor economically feasible.

4.32 By targeting the country's most needy rural zones, the proposed program will improve quality of life, promote new types of business activities, bring new opportunities to generate income and jobs, and reduce poverty in those regions of the country.

4.33 The program will also be instrumental in introducing and implementing a series of technical and procedural improvements that will minimize the unit costs of the new projects, lead to more efficient use of the investment resources and significantly reduce the size the state subsidy needed for this new phase of the PER. In this way, assuming a baseline scenario, the simulations done of the grid-extension component using a sampling of projects indicate that with the changes to be introduced in this new phase of the PER, the unit cost of the investment can be cut by more than 18% (from US$1,915 to US$1,567 per residence), which implies a projected savings on the total costs of the investment in grid extension of US$9.1 million, and of

US$4.7 million in state subsidies. Similarly, the improvements introduced under the self-generation component imply a smaller investment cost equal to US$1.9 million, and a decrease in the state subsidies of around US$2.1 million, which would mean a total savings of US$11 million in investment costs and US$6.8 million in the form of smaller state subsidies.

4.34 Furthermore, under the components for institutional strengthening and program administration, the capacity of the CNE, SUBDERE and the rural electrification technical units in the three regions with the largest shortfalls will be reinforced, better equipping them to formulate, evaluate and monitor rural electrification projects. In the case of the self-generation projects, the added emphasis on community participation and the dissemination of the program in the most remote areas is expected to make the funded projects more sustainable (paragraphs 2.12, 2.14 to 2.18 and 2.22).

4.35 Finally, the following are among the PER's direct and tangible social and environmental benefits that will improve quality of life: (i) easier access to better education, health, cultural development and information, communications, recreation, and development of productive activities; (ii) greater opportunities to tap into and become mainstreamed in local, regional and national socioeconomic development; (iii) better air quality by energy substitution in favor of sources that cause less pollution and contamination; and (iv) less reliance on nonrenewable fossil fuels.

H. Risks

4.36 One risk is that the improvements recommended in the PROPEF-funded studies may make distribution companies or cooperatives reluctant to participate in the execution of grid-extension projects. In earlier stages of the PER, the state subsidies that such companies or cooperatives received were higher than those now being calculated based on economic and technical efficiency criteria. Although the current formula for figuring the maximum state subsidies does not try to bring about rural electrification at the expense of company profits, the incentives to be offered might eventually be perceived as insufficient to induce private investment, especially in the rural distribution markets, which are becoming more and more costly and difficult to administer. Two mechanisms are being used to minimize this risk. First, the improvements introduced not only bring investment costs down from their historical levels, but also lower the companies' own contribution. Second, throughout the program's preparation and design, efforts were made to include the observations made by the distribution companies and electric power cooperatives about earlier stages of the PER.[38]

[38] The electric power companies were interviewed during the many field visits that the PROPEF consultants made and took active part in the second preparatory workshop, held in Santiago.

4.37 A second risk for the program is the possibility that the private sector investment in or financing of new business modalities in self-generation using nonconventional renewable energy sources may not be strong, given the high initial investment cost in these technologies, the absence of standards and equipment certification, and the fact that private and public users know relatively little about how to manage, execute, operate and maintain these systems. To mitigate this risk, this component is being coordinated with the GEF-CNE-UNDP project started in 2001, on "Removing Barriers to Rural Electrification with Renewable Energy," which has a Global Environment Facility (GEF) grant of US$6 million.

4.38 Because self-generation projects are frequently run by smaller businesses, NGOs or community associations, there is also the risk that these projects might not have long-term financial, technical or institutional sustainability. To minimize that risk, the strategy used in the program's design was to require that only self-generation projects approved by the UTA-CNE would be eligible and must show that they have adequate mechanisms to ensure that service delivery is sustainable for the duration of their useful life (paragraphs 2.15 to 2.18, 3.26 and 4.21).

4.39 Finally, there is also a risk that problems detected in the technical units of the municipalities, regional governments and SERPLACS that are in charge of formulating, evaluating and executing FNDR-financed rural electrification projects might cause delays during the proposed program's implementation. This risk will be mitigated with the component for institutional strengthening, training and social marketing and by making the CNE a technical advisor to the program and co-executing agency. The creation of a UTER in Region IV, the institutional strengthening of the UTs or UTERs in the other regions, and the training that will be provided to those units' professionals will ensure that in this new stage of the PER, the risk of delays caused by difficulties in the regional technical units will be negligible.

CHILE: RURAL ELECTRIFICATION PROGRAM (CH-0174)

Logical Framework

Narrative Summary	Indicators	Means of Verification	Assumptions
Goal To help improve the living conditions of the rural population of little economic means	1.1 A higher income level and lower poverty rates among the benefited rural population.	1.1 National census and statistical reports, and CASEN surveys in beneficiary communities and locations	1. The government continues its support for the poverty-reduction strategy and programs
Purpose The rural populations in the regions served by the program have efficient and sustainable electric power services	1.1 Number of residences electrified by grid extension or self-generation increases *Annual Goals (thousands)* **Expanded coverage** / **Regularized service** 2003: 6.9 / - 2004: 9.5 / 1.2 2005: 9.5 / 1.2 2006: 6.9 / 1.4 **Total: 32.8 / 3.8** 1.2 By the program's end, electricity consumption supplied by the projects in the benefited areas increases 1.3 Service availability for the self-generation projects stays above 85%[1] every year	1.1 National census and statistical reports/special surveys/the program's progress report 1.2 Reports from the CNE, the electric power distributors, suppliers and cooperatives 1.3 Audit reports/supervision reports/monitoring activities	1. The electric power distributors, suppliers and cooperatives honor their commitments to operate and maintain electric power services 2. Income levels among the rural population served by the program hold steady or increase, so that the assumed electricity consumption levels materialize

[1] Measured on the basis of the average service interruption rate (the percentage of the year that the equipment is out of service) for the various types of self-generation projects.

Narrative Summary	Indicators	Means of Verification	Assumptions
Components			
1. Rural electrification coverage by grid extension and self-generation increased in each of the program's ten regions	1.1 Electricity coverage in 2006 reaches or remains, as a minimum, at 90% of the rural residences in each region served by the program The benchmarks, taken from the 2002 Census, are: Region I 79% Region II 78% Region III 79% Region IV 79% Region VII 91% Region VIII 88% Region IX 76% Region X 79% Region XI 73% Region XII 74% *By the end of program execution:*	1.1 National census and statistical reports/special surveys	1. The subsidies to be offered are sufficient to encourage private investment 2. Widespread private sector participation in financing new business modalities in self-generation materializes 3. Users, especially the indigenous communities, accept and use the new electricity services 4. There is no resistance on the part of the distributors, suppliers or cooperatives to the improvements identified in the program
	1.2 The amount of the subsidy is between 10% and 15% less than it would have been without the technical improvements and planning that this operation introduced	1.2 Estimate of the program's costs with and without the improvements. Information on the evaluation method used to set the ceilings on the subsidies, contained in portfolios of program-financed individual projects	
	1.3 The small and micro enterprises that are the energy service providers operating the self-generation systems maintain positive cash flows	1.3 Program progress report	
	1.4 At least 2,000 more residences electrified through self-generation projects that use renewable energy (solar, wind, biomass or water)	1.4 Program progress report	

Narrative Summary	Indicators	Means of Verification	Assumptions
2. Institutional strengthening, training and social marketing executed	1.1 The CNE's Technical Support Unit (UTA-CNE) is established and in operation by October 2003	1.1 Program progress report/component progress report	1. The officials of the various units taking part in the program's implementation are willing to receive the corresponding training
	1.2 Rural electrification technical unit (UTER) for Region IV is established and in operation; professional staff of the UTERs for regions IX and X and the UTs for the other beneficiary regions trained by December 2003	1.2 Program progress report/component progress report	
	1.3 SUBDERE's capacity for management, monitoring and control strengthened: a) The UCN's accountant/auditor contracted by October 2003 b) The UCN's financial accounting system in place, tested and operational by December 2003	1.3 Program progress report/component progress report	
	1.4 Interministerial committee (SUBDERE, CNE, MIDEPLAN and DIPRES) created and functioning: a) establishment, membership and operation of committee approved by October 2003 b) meetings held every four months	1.4 Program progress report/component progress report/minutes of meetings of the Commission	
	1.5 Training in social and environmental matters/ environmental brief: a) At least 150 staff from the various government offices and managers of community- and company-run projects trained in social and environmental matters by January 2004 b) 80% of the environmental briefs for the projects presented for review by the UT-UTER are approved without corrections	1.5 Program progress report/component progress report/number of participants in workshops	

Narrative Summary	Indicators	Means of Verification	Assumptions
	1.6 Marketing a) Number of meetings held with the community interested in electrification services	1.6 Program progress report /component progress report /minutes of meetings with the community	
Activities 1. Program administration 1.1 SUBDERE 1.2 CNE 1.3 UT/UTER	For a total of US$1.7 million 1.1 US$400,000 1.2 US$400,000 1.3 US$900,000	1. Budget and execution timetable 2. Plan of activities / program monitoring and evaluation system	1. The rural population in the new areas to be electrified under the program request electricity services by means of grid extensions or self-generation
2. Component for government incentives in rural electrification 2.1 Incentives to investments in grid extensions a. Electrification of localities b. Regularization of customers 2.2 Incentives to investment in self-generation a. Self-generation systems b. Studies supporting projects	For a total of US$47.7 million 2.1 US$32.3 million a. US$31.4 million b. US$ 0.9 million 2.2 US$15.4 million a. US$12.9 million b. US$2.5 million	1. Budget and execution timetable 2. Plan of activities / program monitoring and evaluation system	
3. Institutional strengthening, training and marketing 3.1 Technical and social and environmental consulting services 3.2 Training in social and environmental matters 3.3 Training in grids and self-generation 3.4 Regional seminars	For a total of US$1.3 million 3.1 US$400,000 3.2 US$200,000 3.3 US$600,000 3.4 US$100,000	1. Budget and execution timet able 2. Plan of activities / program monitoring and evaluation system	

Annex II

Rural Electrification Program

CH-0174

Procurements

Category	Responsible for the procurement	Type of Bidding	Amount	Effected in:							
				2003		2004		2005		2006	
				1st Sem	2nd Sem	1o. Sem	2o. Sem	1st Sem	2nd. Sem	1st Sem	2nd Sem
Equipment											
UTA-CNE	CNE	CB	10,550		6,950	600	600	600	600	600	600
UTER	Respective regional government	CB	149,300		127,700	3,600	3,600	3,600	3,600	3,600	3,600
SUBDERE	SUBDERE	CB	54,150		19,950	5,700	5,700	5,700	5,700	5,700	5,700
Total equipment			**214,000**								
Consulting and software											
Preparation of price database	SUBDERE/CNE support	CB	100,000			100,000					
Preparation of tariff database	SUBDERE/CNE support	**ICB**	200,000		200,000						
Strengthening service providers	SUBDERE/CNE support	CB	100,000		100,000						
Accounting and financial software	SUBDERE	CB	45,000		45,000						
Total consulting and software			**445,000**								
Overall Total			**659,000**		499,600	109,900	9,900	9,900	9,900	9,900	9,900