

**Document of  
The World Bank**

**Report No: 17495-AR**

**PROJECT APPRAISAL DOCUMENT**

**ON A**

**PROPOSED LOAN**

**IN THE AMOUNT OF**

**IBRD LOAN US\$46.5 MILLION/GEF GRANT SDR \$10.5 MILLION  
(US\$14 MILLION EQUIVALENT)**

**TO**

**THE REPUBLIC OF ARGENTINA**

**FOR A**

**RENEWABLE ENERGY IN RURAL MARKET PROJECT**

**August 7, 1998**

**Finance, Private Sector and Infrastructure, Sector Unit  
Argentina, Chile and Uruguay, Country Management Unit  
Latin America and the Caribbean Regional Office**

## CURRENCY EQUIVALENTS

(Exchange Rate Effective June 1998)  
Currency Unit = Argentine Peso (A\$)  
US\$1 = A\$1

**FISCAL YEAR**  
(January 1 to December 31)

## ABBREVIATIONS AND ACRONYMS

AC	Alternate Current
AFU	Administrative and Financial Unit
DC	Direct Current
FCT	Tariff Compensation Fund ( <i>Fondo de Compensación Tarifaria</i> )
FEDEI	Electricity Investment Development Fund ( <i>Fondo Especial de Desarrollo Eléctrico del Interior</i> )
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GOA	Government of Argentina
ICB	International Competitive Bidding
ICR	Implementation Completion Report
EIRR	Economic Internal Rate of Return
IFRR	Internal Financial Rate of Return
NGO	Non-Government Organization
NPV	Net Present Value
OED	Operations Evaluation Department
PAEPRA	Electricity Supply Program for the Dispersed Rural Populations ( <i>Programa de Abastecimiento Eléctrico a la Población Rural Dispersa</i> )
PCU	Project Coordinating Unit
PIU	Project Implementation Unit
PG(s)	Provincial Government(s)
PRA(s)	Provincial Regulatory Agency (ies)
PV	Photovoltaic
RES	Renewable Energy System
SE	Secretariat of Energy
SHS	Solar Home System
SOE	Statement of Expenses
TOR	Terms of Reference
WHS	Wind Home System
Wp	Watt Peak
WTP	Willingness to Pay

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Country Manager/Director: Myrna Alexander  
Sector Manager/Director: Danny Leipziger  
Task Team Leader: Ricardo Klockner

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**Argentina**  
**Renewable Energy in Rural Market**

## Project Appraisal Document

Latin America and the Caribbean Regional Office  
Finance, Private Sector and Infrastructure

Date: August 5, 1998  
Country Manager/Director: Myrna Alexander  
Project ID: AR-PE-6043/AR-GE-45048  
Sector: Energy  
Lending Instrument: Specific Investment Loan

Task Team Leader: Ricardo Klockner  
Sector Manager/Director: Danny Leipziger  
Program Objective Category:  
Private Sector Development  
Program of Targeted Intervention: ☐ Yes ☒ No

**Project Financing Data** ☒ **Loan** ☐ **Credit** ☐ **Guarantee** ☐ **Other [Specify]**

**For Loans/Credits/Others:**

Amount (US\$m/SDRm): IBRD Loan US\$46.5m; GEF Grant SDR 10.5 m (US\$14m equivalent)

Proposed terms: ☐ Multicurrency ☒ Single currency, specify  
Grace period (years): 3 ☐ Standard Variable ☐ Fixed ☒ LIBOR-based  
Years to maturity: 15  
Commitment fee: 0.75%  
Front end fee: 1.0%

**Financing plan:**

Source	Local	Foreign	Total
	US\$ million		
Government (National and Provincial)	1.9	39.1	41.0
Customers	17.2	0.0	17.2
IBRD	16.9	29.6	46.5
Global Environmental Fund (GEF)	3.5	10.5	14.0
Concessionaire	19.0	49.5	68.5
<b>Total</b>	<b>58.5</b>	<b>128.7</b>	<b>187.2</b>

**Borrower:** The Argentine Republic

**Recipient:** The Ministry of Economy

**Guarantor:** N/A

**Responsible agency(ies):** Secretariat of Energy (SE), Provincial Government (PGs)

Estimated disbursements (Bank FY/US\$m)	1999	2000	2001	2002	2003	2004
Annual	5.1	4.8	8.8	11.5	11.0	5.3
Cumulative		9.9	18.7	30.2	41.2	46.5

Estimated disbursements (GEF FY/US\$m)	1999	2000	2001	2002	2003	2004
Annual	2.5	2.1	2.4	3.0	2.7	1.3
Cumulative		4.6	7.0	10.0	12.7	14.0

Project implementation period:  
6 years

Expected effectiveness date:  
December 31, 1998

Expected closing date:  
June 30, 2004

## **A: Project Development Objective**

### **1. Project development objective and key performance indicators (see Annex 1):**

Project development objectives are to:

- a) Provide rural areas with reliable electric supply in a sustainable manner, using renewable energy technologies, where feasible;
- b) Support strategic studies and actions required at the national level to strengthen the power sector reform;
- c) Support the GOA strategy to expand private sector participation in the provision of electricity in rural areas; and
- d) Promote environmentally sound energy resource development in Argentina.

Global GEF objectives are to:

- a) Remove market barriers to application, implementation, and dissemination of renewable energy sources; and
- b) Reduce global warming by reducing greenhouse gas (GHG) emissions from thermal generation using hydrocarbons.

## **B: Strategic Context**

### **1. Sector-related Country Assistance Strategy (CAS) goal supported by the project (see Annex 1):**

CAS document number: 16505-AR

Date of latest discussion of the CAS: May 15, 1997  
Progress Report: March 17, 1998

The proposed project is part of the Bank's assistance strategy and supports the objectives of promoting private sector investment in the power sector as well as environmentally sustainable management of natural resources.

### **GEF Operational Strategy/Program Objective Addressed by the Project:**

- The proposed project is fully consistent with the GEF Climate Change Operational Program #6 "Promoting the adoption of renewable energy" because its goal is to remove barriers and reduce implementation costs of such technologies. GEF support would help to reduce information barriers to both investors and customers, address high initial cost barriers for RES, and train the regulatory agencies in the monitoring of renewable energy operations of concessionaires.

### **2. Main sector issues and Government strategy:**

There are four main issues:

- there are 2.5 million people (8% of the country population) living in low density rural areas having no access to electricity service;
- the high investment costs required to provide electricity to dispersed rural populations;
- the limited financial capability of the PGs to provide electricity services to this population; and
- the lack of institutional capability of the PRAs to develop their regulatory functions particularly in RES.

The GOA strategy to address these issues comprises:

- the creation of a regulatory and policy environment to encourage private sector participation in providing electricity supply to rural areas;
- the improvement of the efficiency of energy services delivery; and

- the strengthening of the PRA capability.

The successful implementation of the reform of the energy sector and the corresponding privatization of power enterprises carried out by the national government and the majority of the PGs is providing a favorable climate for private sector participation under concession arrangements.

The GOA's basic strategy to promote electrification of dispersed areas consists of:

- support for electrification of public service centers that provide important communal benefits;
- extension of its existing lifeline tariff policy in the urban sector to the lowest income households in dispersed areas; and
- policy and institutional support to create an environment where the private sector can take a lead role through the concession system in providing electricity services to all other households in these areas.

### ***3. Sector issues to be addressed by the project and strategic choices:***

The project would address the following sector issues:

- lack of access of rural populations to energy supply; and
- limited financial capability of the PGs.

The project's approach is to develop a sustainable electricity market in dispersed areas, served and financed by private concessionaires using renewable resources and environmentally clean technologies, wherever feasible. The private concession approach for off-grid services has many potential advantages but has not been tried anywhere. The challenge is to design a scheme that minimizes government subsidies but enables private investors to obtain a fair return for their participation.

The main market barriers are:

- *Insufficient information for prospective concessionaires to make the decision to participate in the bidding process. These include information on market size and characteristics, the costs of operation and maintenance of systems in dispersed and difficult terrain, failure rates of systems and components, adequacy of proposed tariffs, and potential difficulty in bill collection.*
  - ⇒ Lack of information on market characteristics, real costs for operation and others will be addressed by a number of market profile and demand studies and more detailed analysis of typical cash flows in a concession in each of the provinces participating in the project. The Bank Loan and GEF grant would finance these studies, as well as training of provincial regulators in the regulation of renewable operations.
- *Need for substantial investment resources at the front end, due to the high capital cost, despite low operating costs of renewable energy investments.*

⇒ The financing gap will be filled by the application of the IBRD, GEF and GOA counterpart funding. The investment requirements for the project would be shared by the Bank loan, GEF, GOA funds, customers, and Concessionaire equity. Only incremental costs, i.e., costs exceeding those required for a conventional least-cost program that does not address low-carbon emission goals, will be funded from GEF resources.

- *Risks associated with market reception of a relatively new technology. Even in the case where the shift to renewable from traditional fuels or conventional electricity systems is more advantageous to the consumer economically, the shift will not necessarily occur if left entirely to the market. The reasons on the consumer side include lack of familiarity in the existing technologies and inadequate information on their benefits, and high up front initial costs, which need to be financed.*

⇒ The risks to consumer acceptance will be addressed by a combination of: (a) promotion and demonstration programs to educate rural area dwellers on the benefits of the new technologies; and (b) judicious application of GEF grants and GOA subsidy funds to reduce the high costs to customers of the new technologies.

- *Provincial Governments and PRAs have limited capacity to supervise project progress and provide technical assistance to implement the project.*
- The lack of the PGs' capability will be addressed by providing technical and legal assistance to strengthening its institutional capability.
- The lack of the PRA capability will be addressed by training the staff and providing technical assistance.

## C: Project Description Summary

1. *Project components (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):*

<u>Component</u>	<u>Category</u>	<u>Cost Incl. Contingencies (US\$m)</u>	<u>% of Total</u>	<u>Bank- financing (US\$m)</u>	<u>GEF financing (US\$m)</u>
• Electricity generating equipment for rural markets	Physical	172.6	92	40.1	9.4
• Two (2) pilot sub-projects based on Wind Home System (WHS)	Physical/ Institutional	0.6	1	0.0	0.4
• Capacity building program	Building Institutional	6.5	3	2.5	2.8
• Project administration	Building Project management	7.0	4	3.4	1.4
• Front Fee		0.5		0.5	
	Total	187.2	100	46.5	14.0

### GEF Financing

The incremental cost proposed to be supported by the GEF grant amounts to US\$14 million. The estimate expressed in current dollars (including contingencies) is as follows:

- **US\$9.4 million to support the installation by concessionaires of about 84,800 Solar Home Systems (SHS) in the provincial rural markets. This amount includes \$0.7 million for physical contingencies to cover potential uncertainties in final number and cost of SHS units. The GEF grant would finance the incremental costs of 50W, 70W, and 100W SHS.**
- **US\$400,000 to support a pilot/demonstration program involving the installation of two pilot Wind Home Systems (WHS) in two communities in Argentina. This pilot project component is expected to demonstrate the commercial viability and long-run economic potential of WHS (small turbines for individual homes), as a cost-effective alternative to SHS in sufficiently windy areas, and to catalyze future development by private investors. The sub-project will be implemented by consultants with cooperation by the concessionaire in the selected provinces. An evaluation of the operating performance and economics of the systems will be made after one year of continuous monitoring.**

**US\$2.8 million to support capacity building programs aimed at removing barriers to the adoption of renewable energy technology and reduce concessionaire risks. The GEF grant would assist the SE, the PGs, and the PRAs in: (i) preparing detailed market studies; (ii) promoting SHS and public education programs; (iii) carrying out feasibility studies for centralized renewable systems; (iv) conducting dissemination workshops for concessionaires, PRA, customers, and Non-Government Organizations (NGOs); (v) establishing standards and certification systems for equipment and installers; (vi) improving the solar/wind information; and (vii) preparing a study on how to improve the availability of DC appliances compatible with SHS in the rural dispersed areas; (viii) strengthening the PRAs of the participating provinces, by the training of PRA staff in renewable operations and monitoring and evaluation of concessionaire's performance.**

- **US\$1.4 million to support the management of the project, including support to the PCU, the PGs, and the PRA in activities related to management, monitoring, supervision, and evaluation of the project.**

## ***2. Key policy and institutional reforms supported by the project:***

- **Establishment of a power market for private sector participation.**
- **Development of an institutional framework for off-grid rural electrification.**

## ***3. Benefits and target population:***

**The ultimate beneficiaries and target population of the project are about 108,000 low-income households located in the rural dispersed areas of 10 Argentine provinces. These households will be provided electricity services for lighting and basic communications. Apart from the physical benefits, it is expected that there will be a remarkable improvement in the quality of life of this population due to the ability to enjoy a clean and modern form of energy for end-uses, such as illumination. There should be a positive impact on education, productivity and social development. The project will also benefit the private sector in Argentina by enabling the creation of sustainable business operations through the concessions and expansion of the market for renewable energy equipment. Part of this equipment will be produced by local industries. The central and provincial governments will benefit by successfully achieving the electrification of rural dispersed populations through a system expected to be managed efficiently by the private sector.**

**The global environmental benefit of the project would be the creation of a sustainable SHS market in the participating provinces, which in turn would lead to reduced greenhouse gas emissions by displacing the use of conventional technologies. It is anticipated that the direct**

project outputs alone would abate about 1.5 million tons of CO<sub>2</sub> during the whole project lifetime.

#### **4. Institutional and implementation arrangements:**

Institutional and implementation arrangements for the project are based on a Project Implementation Plan prepared by the SE, which was agreed upon during project appraisal.

**Flow of funds.** The recipient of the proposed GEF grant and Bank loan will be the Government of Argentina. The Bank loan and the GEF grant will be transferred to the PGs on a grant basis together with funds from the Electricity Investment Development (FEDEI) and Tariff Compensation (FCT) funds.

**Policy and Guidance.** The Ministry of Energy, through the Secretariat of Energy (SE), will provide the policy framework for rural energy development and overall guidance to the project. The PRA of each participating province will regulate the activity of concessionaires to ensure private participation, and maximize social benefits.

**Project Coordination:** A Project Coordinating Unit (PCU) will be established at the SE. The PCU will be in charge of the coordination and supervision of project implementation at the national level. The staffing and structure of the PCU was agreed during appraisal. The PCU will receive administrative support from the General Directorate of Cooperation and Financial Assistance (AFU) at the SE for processing requests for disbursement of the Bank Loan and GEF Grant, and maintain the special account and separate accounts of the project as well as for each province. At the provincial level, project preparation, coordination, and supervision will be carried out by a Project Implementation Unit (PIU), assisted by consultants financed by the Bank and GEF. The PIU will be composed of one coordinator assisted by provincial government staff.

**Project Implementation:** Ten (10) provinces, (out of a total of 23) that have reformed the power sector and allow private participation in the electricity market will participate in the project. The PG of these selected provinces will supervise the project activities at the provincial level after the effectiveness of the concession contract. The PRA will verify compliance with the concession contract and certification of equipment.

**Private Investors Participation:** The project will be implemented by: (a) new concessionaires, whose contracts would be awarded through international competitive bidding (ICB); and (b) existing concessionaires that have been selected prior to the approval of the proposed Bank loan, and would agree to serve the dispersed rural market in addition to the concentrated market. Existing concessionaires would be eligible for Bank/GEF support if and only if: (i) the Bank has no objection to tariffs schedules revised and adapted to serve dispersed rural consumers; and (ii) procurement of equipment to serve dispersed rural consumers is done through ICB.

**Procurement.** The physical components of the project will be implemented by the private sector. In the case of provincial newly developed rural markets with concessions procured under the project, the concessionaire will carry out the procurement process using its own rules. In the case of concessions procured prior to the project or under procedures that were not acceptable to the Bank, the concessionaire will carry out the procurement of goods in accordance with Bank's guidelines, dated January 1995 and revised in January and August 1996 and September 1997. The procurement of consultant services will be carried out by the SE following Bank's guidelines, dated January 1997 and revised in September 1997.

**Accounting, Financial Reporting, and Auditing Arrangements:** The general financing management of the project was assessed by an independent consultant during appraisal. The

consultant recommended to improve the existing budgeting and accounting systems by consolidating them into one database to conform a financial management system acceptable to the Bank. The system will keep project accounts separate from other accounts, and for each province. The GOA agreed to implement the recommended systems. The PCU will submit to the Bank consolidated annual reports. The Auditoría General de la Nación or independent auditors acceptable to the Bank would audit the special accounts, all project accounts, and SOEs.

**Monitoring and Evaluation Arrangements:** Given the innovative nature of this lending operation, the Bank would carry out at least two full supervision missions per year up to the mid-term review. Monitoring and evaluation would be done by the Bank and qualified consultants. Concessionaires will submit progress reports to the PGs, following formats included in the PIP. The PGs will submit the reports to the PCU, including its evaluation and supervision of the project. The PCU will submit to the Bank quarterly progress reports by April 30, July 31, October 30 and January 31 of each year. A mid-term review will be carried out no later than December 31, 2000. Given the large number of provinces participating in this project, the PCU will furnish to the Bank semi-annual updates on procurement planning and concession contracts management. Performance indicators, based on Annex 1a, were agreed with GOA at appraisal.

## **D: Project Rationale**

### *1. Project alternatives considered and reasons for rejection:*

#### **Technical Options**

**Small consumers.** Although the option of providing electricity to small consumers by installing small diesel generators is feasible, it was evaluated as an inferior solution because of: (a) the requirement for local qualified technical expertise to operate and maintain the equipment; (b) the need to supply diesel fuel to remote rural areas, and (c) the polluting nature of the technology. The preferred alternative is the use of SHS because of its technical simplicity, non-polluting feature, and the willingness of the international community and the GOA to overcome its higher cost during an initial period of five years. After that period, it is expected that market for SHSs will have sufficiently developed so that external support is no longer necessary (Annex 4a, para.17).

**Small communities.** The option of providing electricity to small consumers by extending the existing medium voltage grid to remote dispersed rural population was discarded because it is not the least cost solution.

#### **Delivery Mechanism**

The option of implementing the project through individual private dealers was discarded because: (a) it is less suited to the task of providing electricity service to a relatively large market of dispersed population over a period of at least 15 years; (b) with 10 provinces involved, it will be harder to manage from the GOA's point of view; and (c) there is already substantial experience with the concession system in Argentina. The market concession contract is the option chosen by the project because the private concessionaire, who will be selected in a competitive process, will be committed and obligated to provide electricity services (upon request from the customers) to a relatively large market of dispersed population over a period of at least 15 years.

#### **Financial Arrangements**

The option of providing a credit line to support the financing of the concessionaire's investment program was discarded, because of the distortions it could introduce in the capital markets of the country. Instead, a subsidy to those customers connected during the initial five years of the

project, shall be granted once the PRA (or its representative) certifies that the SHS (or equivalent systems) has been installed by the concessionaire in accordance with pre-established standards and conditions. The subsidy will be given for the initial investment needed to connect the rural customer. The amount of this subsidy is estimated at about 50 percent of the initial investment needed to provide electricity service to the customer. Notwithstanding, the concessionaire must finance the equipment and installation costs from its own resources before claiming from the PG the subsidy to the consumer.

**2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned):**

Sector Issue	Project	Latest Supervision (Form 590) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
<b><u>Bank-financed</u></b> Supported the reform of the national power sector and the privatization of the federal government-owned distribution utilities, which were successfully implemented. <ul style="list-style-type: none"><li>Support the reform in eight provinces. The privatization and deregulation of the provincial economy and improved managerial tools were implemented.</li><li>Assist the PGs in implementing financial management reforms, and strengthening their capacity to plan, program, finance, execute, and monitor investment programs. It also provides financing for institutional development and investments.</li></ul>	SEGBA V (AR-PE-5968) US\$276 million. Related Technical assistance completed  First Provincial Reform Loan (AR-PE-6035, US\$300 million).  Provincial Development II Project (AR-PE-6018, US\$ 225 million).	S  HS  S	S  HS  U
<b><u>Bank-Financed Projects Outside of Argentina:</u></b> <ul style="list-style-type: none"><li>Bank/GEF supported solar home system project and village hydro subprojects. Private participation, sustainable energy supply. Energy efficiency and conservation</li><li>Bank/GEF-supported solar home systems project. Private participation. Sustainable energy supply</li><li>Bank/GEF-supported small grid connected power project. Private participation. Sustainable energy supply.</li></ul>	Sri Lanka Energy Services Delivery Project (LK-PE-10498:IDA-16.9 SDR million and LK-GE-3995: GEF-5.9 SDR million). Indonesia Solar Home Systems project (ID-PE-35544, US\$20 million and GEF US\$24.3 million). Indonesia Renewable Energy in Small Power project (ID-PE-42882:US\$66.4 million, GEF:US\$4.0 million).	S  U <sup>1</sup>  U <sup>1</sup>	S  U <sup>1</sup>  U <sup>1</sup>

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory).

**3. Lessons learned and reflected in the project design:**

No similar project has been financed in Argentina. Lessons derived from Bank studies and ongoing projects are described below in italics:

- Solar home system projects must: (i) overcome the up front cost barrier created by their high initial cost (compared to conventional alternatives) to secure an adequate market size; (ii) establish responsible and sustainable PV sales and distribution infrastructure; and (iii)*

<sup>1</sup> These projects currently have an unsatisfactory implementation progress caused by the recent deterioration of the macroeconomic situation in Indonesia.

*provide quality product and services* (World Bank Technical Paper #324, best Practices for Photovoltaic Households Electrification Programs, 1996). The concession contract will establish adequate cost recovery, financing conditions, and tariff to make affordable to the rural customer the payment for the service and installation of the SHS. The concessionaire will create the necessary infrastructure to supply and operate the SHS in a sustainable manner. All SHS will be required to comply with technical specifications, ensuring quality products and services.

- *SHS project should: (i) operate on a full cost-recovery basis; (ii) provide adequate consumer information; and (iii) ensure adequate management skills in local implementing organizations.* (World Bank Technical Paper #304, Photovoltaic Applications in Rural Areas of the Developing World, 1995). Each concession contract will establish a full cost-recovery for the unsubsidized part of the investment. Each proposed concession contract will be reviewed by the Bank and the PCU. A program to promote among the rural population the use of electricity services based on RES will be designed by the SE. The institutional capability of the PRAs will be strengthened to ensure adequate monitoring of the concessionaire's compliance with the contract.
- *Implementation of a standardized small power purchase agreement and tariff, derived from (i) published purchase prices not to exceed the utility's avoided cost, and (ii) standard and efficient small power market, are central to the realization of a sustainable and efficient small power market.* (Indonesia Second Rural Electrification Project; Ln 3845-IND). The contract will clearly establish the obligations of the concessionaire (in particular the obligation to connect a customer upon request) and the tariff to be paid by the customer for the electricity service. The concession contract will also establish the amount of the initial subsidy to be granted to the customer and the procedure (including required certification of installation) to be followed by the concessionaire to claim it from the corresponding PG.
- *Rigorous economic and financial analysis of rural electrification projects and an increased attention to cost recovery are key to successful project implementation* (OED Report #13291, Rural Electrification in Asia: A review of Bank experience, June 1994). Economic and financial analyses are required for each proposed concession.
- *Demonstration of commercial renewable energy technologies can remove information barriers and facilitate widespread replication.* The windfarm component of the India renewable resources development project (Loan 3533-IN/Cr 2449-IN). (Mid-term evaluation report, November 1995). Use of SHS at the scale proposed for Argentina will generate substantial operational experience and ease replication of the concession-approach in other parts of the world. The two WHS pilot components would demonstrate that given adequate wind resources individual WHS can be as cost effective as SHS.
- *Government incentives, including taxes, duties, and subsidies, must be consistent with national and sectoral objectives for maximum long-term impact* (Mid-Term Evaluation Report of the India renewable resources development Project, November 1995). The current incentive framework in Argentina is largely satisfactory. While import duties do not discriminate against RES, proposal of the GOA is being considered by the Congress to exempt the procurement of RES from the value added tax.

#### *4. Indications of borrower commitment and ownership:*

**National Government:** The GOA has almost completed the reform of the power sector. The market has been unbundled (generators, transmitters, distributors, and large users) and the main power utilities and power plants have been privatized. Now the GOA and the PGs are gradually progressing in the transformation of the provincial power systems. The provincial electricity service is divided into two markets: (i) the concentrated market or grid-connected market; and (ii) the dispersed rural or off-grid market.

The GOA, through the SE, has initiated the implementation of the Electric Supply Program for the Rural Dispersed Population (PAEPRA), which aims at supplying electricity to about 1.4 million inhabitants (300,000 households) and over 6,000 public services (schools, first aid medical centers, police stations, and civil services). The main characteristics of the PAEPRA are: (i) the program will be implemented through concession of electricity service in each province; and (ii) the electrification of the households will be done mainly through RES. The Argentine concession approach to the delivery of renewable energy services has been presented by GOA in various international fora and is now recognized as sound. The Argentine GEF focal point, located at the Ministry of External Affairs, has endorsed the request for GEF support for the proposed project.

**Provincial Governments:** PGs have shown strong interest in participating in the proposed project. Ten (10) participating provinces have signed letters of intent to participate in the project, and in four (4) of them, market studies have been carried out by consultants financed by the GEF of France. The provinces of Jujuy and Salta have signed concession contracts with private investors to supply energy to rural dispersed areas using RES.

**Private Sector:** Strong interest in the project has been expressed by various potential foreign and local private investors. An international workshop was carried out, with the attendance of about 60 private investors, provincial power regulators, and NGOs to publicize the project, obtain technical and other inputs to project design from various stockholders and assess concerns of prospective investors. The project was very well received by those attending.

#### *5. Value added of Bank and GEF support in this project:*

Bank and GEF participation in the project will complement GOA's own resources and expertise and ensure the design of a sustainable delivery mechanism for renewable energy services that is innovative and has potential for replication in other countries. The only large-scale commercial SHS project so far is the Bank/GEF project in Indonesia which focuses on development of a private SHS dealer industry (installation, maintenance, customer relations) as the mechanism for disseminating SHS technologies. The GOA has indicated that Bank/GEF involvement is needed not only for financing considerations but, equally important, for the Bank's expertise and experience internationally that are vital to pioneering projects of this type. Bank presence would help ensure transparency in awarding concessions and compliance with contractual obligations. Finally, the Bank's involvement ensures that the renewable energy project is designed and implemented within the framework of the reformed electricity sector. GEF involvement will permit more rapid implementation and penetration of renewable energy technologies than would normally be the case, including broader provincial coverage, and more intensive monitoring and evaluation of the project, which is appropriate for an innovative project of this nature.

## **E: Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)**

### **1. Economic (supported by Annex 4):**

The rural markets of the project are composed of rural consumers and public institutions of 10 participating provinces. Each province represents a market to be privatized. Data from market surveys in five representative provinces were used to determine costs and benefits in the ten provinces. The costs consist of investment costs, replacement costs and operations and maintenance costs of the various RES's. The benefits for RES's are based on the estimated consumer benefit from the use of these systems. These are approximated by the current energy expenditures (i.e. current actual fuel cost) for lighting and social communication which consumers incur in the without project case. This measure of benefit does not capture the consumer surplus; it was approximated by adding a 15% surcharge to the benefit measure (the current energy expenditures). The net benefit of the ten provinces are aggregated to calculate the Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) of the project. The NPV is calculated at an annual discount rate of 10 percent over a period of 15 years, the expected lifetime of the main component of SHS, the PV panels.

**The EIRR and NPV of the individual provinces and total project are summarized below:**

Provinces	Total number of customers	EIRR (%)		Economic NPV (000's US\$) with GEF	Economic NPV (000's US\$) without GEF	Representative Market
		with GEF	without GEF			
Santiago del Estero (*)	25,004	10.1	7.8	64	-2,173	25,000 customers
Misiones	23,887	10.8	8.4	561	-1,211	
Corrientes (*)	19,500	14.3	11.8	2,970	1,323	20,000 customers
Entre Rios (*)	14,708	12.8	10.2	1,262	118	15,000 customers
Formosa	13,395	12.4	9.9	1,014	-49	
San Luis (*)	3,160	12.3	9.8	285	-28	3,000 customers
Rio Negro	2,574	13.1	10.6	372	78	2,000 customers
Mendoza (*)	2,176	14.0	11.4	278	111	
Jujuy	2,320	12.7	10.5	254	53	
La Rioja	2,206	12.5	10.0	216	3	
<b>Total Project</b>	<b>108,930</b>	<b>12.0</b>	<b>9.6</b>	<b>7,276</b>	<b>-1,775</b>	

Provinces marked (\*) were used as representative markets in the financial analysis.

**Economic Benefit Summary:** The EIRR of the project with GEF participation is about 12.0 percent yielding net economic benefits amounting to a NPV of about US\$7.3 million. The EIRR and NPV amounts vary by province from a low 10.1 percent EIRR (almost zero NPV) in Santiago del Estero, to a high 14.3 percent EIRR (US\$2.97 million NPV) in Corrientes. The EIRR without GEF participation, drops to 9.6%. GEF support thus makes this project economically feasible.

**Sensitivity Analysis:** Sensitivity analysis indicates that the variables with the most impact on the EIRR of the project are RES cost (affecting the net benefit), discount rate (changing the opportunity cost of capital), and the WTP (affecting the benefits). Cost decreases of 10-20% for RES increase the project's EIRR by about 4 to 5% for each 10% decrease in system cost. EIRR decreases by 4% for an increase in cost of 10%. Also, by excluding induced demand for RESs

after the end of the project, the EIRR decreases by about 3%. A 20% increase in induced demand (versus a 10% increase in the base case), increases EIRR by 2.5%. Improving or decreasing the market penetration of the project by 10% and -10%, respectively, has little impact. Changing the discount rate from 10% to 12% and then to 14% (changes only the NPV), causes respective decreases in NPV by US\$7.3 million and US\$12.7 million. These are significant changes, given that the base case NPV is only US\$7.3 million.

**Market Penetration of SHS's:** Surveys of rural households show that by far the most likely SHS to be chosen are those of 50Wp, 70Wp and 100Wp. The majority of potential consumers of 50Wp SHS are likely to fall in the low and medium-low income groups, 70Wp SHS are likely to be chosen largely by medium-low income households, and 100Wp SHS largely by medium-high income groups. CIF cost for SHSs of 50Wp, 70Wp and 100Wp respectively, are estimated to be US\$ 550, US\$ 773 and US\$ 970. The installed cost of these SHSs depends significantly on the level of the valued added tax prevailing in Argentina.

#### Comparison Between RES and Conventional Fuels

RES are characterized by relatively higher capital cost than conventional energy technology such as diesel electric power, but the technologies differ in their ability to utilize renewable energy resources which are site-specific and are usually low in cost. SHS, for example, deliver much higher quality light than traditional non-electric fuels such as kerosene, candles and LPG, and are significantly more reliable, convenient and cleaner than kerosene lamps. In general, RES have insignificant environmental impacts (with the exception of small-hydro) and do not produce greenhouse gases, in contrast to fossil fuels. In cases where diesel generation is clearly the least cost solution, as in a high household density situation that is best served by a mini-grid, the project will support its use instead of RES. While extending the utility grid is another option for providing rural electricity, this option is usually constrained by the combination of high cost for grid construction and very low power consumption by customers. Given the low population density and low power consumption in the areas covered by the project, grid extension is unlikely to be economically competitive with either isolated diesel for agglomerated rural populations nor SHS for more dispersed market areas under consideration by the project.

*GEF Approach (supported by Annex 4a).* As explained above, the local benefits of the project will be approximated by the current energy expenditures of households. In addition to local benefits, the project will generate global benefits in the form of a reduction in CO<sub>2</sub> emissions. The GEF grant expresses the willingness to pay of the international community for realizing the global environmental benefit.

The GEF grant size was calculated as the "incremental cost" necessary to make the current economic costs of the renewable energy technologies equal to the conventional alternatives, thus offsetting the incremental costs to households of shifting from traditional fuels to the new technology.

The GEF grant will be provided to users of SHS of 50Wp, 70Wp and 100Wp that are not currently beneficiaries of lifeline tariffs. Due to the economies of scale associated with market penetration, financial assistance to households will have a decreasing trend over 5 years in each province as shown in the table below. The grants will be used to buy down the high up front cost of SHS to this market segment and create an initial consumer base. Users of higher end systems (150W and up) will not get GEF grants since their shift to PV would have negligible or negative incremental costs. As economies of scale in installation are achieved, financial assistance to GEF eligible households will be reduced.

SHS size	GEF Grant (US\$ per installed SHS)				
	Year 1	Year 2	Year 3	Year 4	Year 5
50Wp	125	125	120	105	70
70Wp	105	105	100	90	60
100Wp	85	85	80	70	45

## 2. Financial (supported by Annex 5)

The financial analysis of the provincial rural market was undertaken in five markets having a number of customers close to the number of potential customers of the provinces to be served by concessionaires. A commercial evaluation was carried out for each potential market size by simulating the financial operation of a concession during 15 years. The number of customers of each representative market is indicated in the table below.

### Representative Markets

Market	Representative Market Number of customers	Province Name	Number of customers
1	25000	Santiago del Estero	25,004
		Misiones	23,887
2	20000	Corrientes	19,500
3	15000	Formosa	13,395
		Entre Rios	14,708
4	3000	San Luis	3,161
5	2000	Rio Negro	2,574
		La Rioja	2,206
		Jujuy	2,320
		Mendoza	2,176

The financial analysis was done assuming the market structure of the representative provinces and the financial cost of the equipment and operation and maintenance of the concessionaire. It is assumed that the concessionaires will pay custom duties of 18 percent on the CIF value of imported equipment, and 30 percent income tax. It is assumed that an initiative taken by the SE would approve legislation to exempt the application of the Value Added Tax (VAT) on SHS imported by concessionaires for installation in rural areas. It is also assumed that commercial loans are available to the concessionaires at an average annual interest rate of 11 percent and an 8 year term. The loans are assumed to fill the financing gap left when revenues less operating expenses plus taxes are not enough to finance the investment program of the concessionaire. Regarding tariffs, it is assumed that the concessionaire will recover the cost of service through tariff schedules pre-established by the corresponding provincial PRA, and through subsidies to help consumers pay for part of the initial investment and, for some very low income customers, the operational costs. The tariffs schedule for a given size of SHS will have the following structure: (i) an installation fee to be paid in advance by the consumer (down payment), estimated at 10% of the total initial investment plus installation cost; (ii) a fixed amount subsidy to help a segment of the rural consumers pay for part of the higher initial investment of the electric supply system based on RES. This subsidy will be paid by the provincial government using FEDEI funds, and grants from the GEF and the GOA (the Bank Loan). Only SHS of 50Wp, 70Wp, and 100 Wp, installed during the first 5 years of the concessions will receive a one time compensation with a decreasing trend from the GEF grant. The amount of the subsidies will be explicit in the tariff schedule; (iii) a monthly charge (consumer tariff) to be paid by the consumer:

and (iv) in exceptional cases, a monthly subsidy to help a segment of the very low income rural consumers pay for the monthly charge not fully covered by their payment capability. This particular subsidy will be financed by the provincial government using FCT funds. Public services will pay the full tariff.

The net present value (NPV) of the net cash flow of the concession at a discount rate of 14 percent (base case) over 15 years was taken as the indicator of the attractiveness of the business for the private sector. The sensitivity of the NPV for the base case was tested for changes in key financial parameters (discount rate, market size, investment costs, O&M, and tariff level). The results are presented in the table below.

**Financial Net Present Value (NPV) of Base Case and Sensitivity Analyses**

Market Size Customers	Base Case	Discount Rate		Market Size		Investment Cost		O&M Cost		Tariff	
		12%	16%	+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%
25,000	7,352	8,752	6,205	8,169	6,536	6,665	8,183	6,952	7,751	9,697	5,150
20,000	5,260	6,257	4,444	5,870	4,657	4,768	5,752	4,914	5,607	6,890	3,630
15,000	4,369	5,215	3,712	4,890	3,890	4,047	4,784	4,104	4,673	5,705	3,130
3,000	1,003	1,197	844	1,146	833	878	1,107	861	1,120	1,377	612
2,000	569	678	479	672	488	520	632	479	658	808	348

The above results show clearly how, on one hand, the NPV increases with the size of the market, and on the other hand, the NPV decreases as the opportunity cost of money for the concessionaire increases. As expected, the NPV decreases for increases in either the investment cost or the O&M costs, and decreases for increases in either the market size or the tariffs. The NPV is significantly sensitive to changes in tariffs. An increase of the tariff by 10 percent increases the NPV by about 32 percent in the 25,000 customer market and by about 42 percent in the 2,000 customer market. In all the cases, the concessions appear to be a reasonably good business for the concessionaires. However, it is clear that large markets will be more attractive to the private sector than small ones.

### Subsidies in Electricity Pricing

In the case of RESs the intention is to extend the reach of electricity services by obtaining freedom from the requirement for connection to the grid network, and by tailoring the size of systems to consumer capacity to pay and to the basic energy requirements. Renewables, although considerably more cost-effective in dispersed rural settings than conventional electricity supply, require subsidies for various reasons. The GEF will be providing a US\$14.0 million grant, which is considered a subsidy for this project, reflecting the relative global environmental benefits of RES versus conventional energy sources. The rural consumer will be paying a subsidized tariff financed by the FEDEL. This subsidy recognizes the social value of electricity that the rural consumer cannot pay due to unequal income distribution. These subsidies would also reflect the societal valuation of both consumer surplus and the average cost of electricity. Those benefits are very hard to measure and therefore no attempt was made to qualify them in this analysis.

Another recognized subsidy currently in effect in Argentina is the application of so-called "lifeline" rates for urban consumers. In three provinces, respectively, Santiago del Estero, Formosa and Mendoza, have subsidies estimated to amount to approximately \$4, \$8, and \$5 per month for the lowest electricity tariffs. These amounts are quite similar to, and consistent with the proposed monthly tariff subsidies (US\$6.10-US\$6.40) for the lowest size SHS category (50 Wp) which would be installed in the households of the lowest income groups.

### 3. Technical:

The renewable energy technology supported by the proposed project is technically sound and demonstrated worldwide. Technical viability is further supported by Argentina's prior experience in some provinces with mini-hydro, hybrid solar/wind systems, and SHS. To ensure quality installations, equipment components, systems and installer qualifications will need to satisfy internationally accepted standards. GEF grants will partially finance certification costs.

### 4. Institutional:

#### a. Executing Agencies:

**Private sector.** The private operators will implement the project. They have proven very efficient in the implementation of investments in other sectors (Water and Sewerage Project - Loan 3281-AR). The concession contract will establish conditions for compliance of standards and certification of the equipment. Also, the contract will include temporary clauses establishing conditions and requirements for participating in the project.

#### b. Project Management

**Loan Administration.** The AFU at the SE has proven very efficient in administering Bank loan disbursements and reporting project progress.

**National Project Coordination Unit:** To be successful the project will require a PCU staffed with experienced consultants in project management and private sector participation. During negotiations, agreement will be sought that the PCU: (i) would be established, before loan effectiveness, in accordance with TOR, staffing, and resources acceptable to the Bank; (ii) would hire experts to assist the PCU, PGs, and PRAs during project preparation, supervision, monitoring and implementation.

**Provincial Governments (PGs):** day-to-day management will be carried out at the provincial level. The PGs lack capability to manage the project. During negotiations, agreement will be sought that: (i) the PG would create a project implementation unit (PIU), before loan disbursement, in accordance with TOR, staffing, and resources acceptable to the Bank; (ii) the PIU will be assisted by experts provided by the PCU during project preparation, supervision, monitoring and implementation.

**Provincial Regulatory Agencies (PRAs):** The PRAs will be trained in the regulation and monitoring of RES operations.

### 5. Social:

Project preparation included extensive consultation with public and private sector. The proposed project would have a positive social impact by providing initial electrification services to about 108,000 rural households currently without access to electricity service. Women and children are expected to benefit the most from these rural services. The improved lighting will allow time to undertake additional income generating activities. Women also note that better lighting enables them to respond more quickly to infant needs at night. Children benefit from the additional time to study. Television and radio access will be improved for the entire family. Workshops for promoting and disseminating the project among the customers will be carried out at schools, rural chapels, and community centers. Ensuring customer satisfaction will be a high priority of the project. Households unhappy with the service provided will have the right to withdraw their

participation. Households wishing to upgrade to larger systems and willing to pay the high costs will be allowed to do so.

A framework for preparing a dissemination and consultation strategy was agreed with the PCU. The design of the dissemination strategy would be completed with the assistance of consultants. The objectives of the strategy would be to ensure that intended beneficiaries are fully informed of the mechanisms for accessing project services and participate with the private sector providers in the planning and implementation of the operation and maintenance of the equipment to be installed by the project. To design the strategy, extensive consultations with the PCU, provincial government authorities, potential beneficiaries and private providers as well as an analysis of the market characteristics and willingness to pay information, will be carried out.

The dissemination and consultation strategy would be targeted to the different potential customers in rural areas (single households, groups of the households and community services). The strategy would address the following issues: (i) dissemination of the project characteristics (alternative type of equipment available, application procedures and requirements); (ii) mechanisms for customer participation in operation and maintenance arrangements; (iii) mechanisms for customer participation in monitoring and evaluation arrangements (to ensure client satisfaction and allow potential modifications in delivering, operation, and maintenance mechanisms during the mid-term project review).

**6. Environmental Assessment:** Environmental Category ☐ A ☒ B ☐ C

The use of renewable energy technologies will yield net positive environmental impacts. However, some minor impacts mainly related to the siting of some technologies and the management of wastes generated by maintenance and repair of equipment have been identified. The use of photovoltaics for electricity generation is fairly benign from an environmental point of view. Depending on the materials used in the solar cells, proper disposal procedures will have to be put in place, as well as for the disposal of lead acid or nickel cadmium batteries used in SHS. The installation of small diesel units (lower than 5 kW) in small villages in the rural area will need careful attention to the storage and handling of diesel fluids and the disposal of used fuels. The mini-hydro plants proposed will be run-of river installations, requiring however specific siting criteria.

All of the above minor environmental concerns will be dealt with through specific conditions included in the concessionaire's contract (Annex 2, Box 5) which will include:

- the procedures for the recycling or proper disposal of lead-acid or nickel-cadmium batteries used in SHS and WHS;
- procedures for the proper disposal of solar cells according to the materials used in the manufacture of those cells;
- environmental siting criteria for run-of-river micro-hydro schemes; outside of protected areas, avoiding fish spawning areas, areas of particular ecological or scenic value, protection of revering vegetation, restrictions of access to hunters and fisherman in sensitive areas; and
- procedures for storage, handling and disposal of diesel fuel, and proper recycling and disposal of any batteries used in diesel plants.

The above environmental and safety procedures and measures will also be included in community information programs that will be implemented to disseminate the project among the rural population. The concessionaire will also be required to provide one-on-one training to beneficiaries of these technologies.

**7. Participatory approach [key stakeholders, how involved, and what they have influenced; if participatory approach not used, describe why not applicable]:**

	Preparation	Implementation	Operation
Private Sector	IS/CON	COL	COL
NGOs	CON	IS	IS
Local Governments	IS/COL	COL	COL
Other Donors	IS/COL	IS/COL	IS
Customers	CON	COL	COL

Note: Information Sharing (IS); Consultation (CON); and Collaboration (COL).

**a. Primary beneficiaries and other affected groups:**

The primary beneficiaries of the outcome of this project will be rural dispersed populations that are being electrified. Similarly, the implementation of the project is expected to benefit the private sector and will result in new employment opportunities.

**F: Sustainability and Risks**

**1. Sustainability:**

Sustainability of the proposed project would be assured through enabling the strengthening of the provincial regulatory functions and institutions, and appropriate incentives and returns for the concessionaires. Due to the manner in which the financing of individual systems is structured (a mix of GEF grant for incremental costs, GOA lifetime tariffs/connection fee assistance, and consumer payments), full cost recovery is assured from those customers who sign up for service during the project life. In other words, the sustainability of systems installed with project support is assured for the 15 years concession contract period. Beyond the project life, it is expected that new customers could be signed up, even in the absence of the GEF grant, because expansion of the customer base during the project life and achievement of economies of scale should have reduced operational costs by at least the amount of the initial GEF assistance. Project sustainability will be supported through agreed monitoring and implementation actions. Due to the innovative nature of the Project, a mid-term Review will be scheduled early (by December 2000) to allow the opportunity for mid-course corrections, if necessary. The Bank will also monitor Project Implementation on the basis of quarterly progress reports from the SE, annual independent audits by accounting auditors, and through Bank supervision missions.

**2. Critical Risks (reflecting assumptions in the fourth column of Annex 1):**

<u>Risk</u>	<u>Risk Rating</u>	<u>Risk Minimization Measure</u>
<b>Annex 1, Cell "from Outputs to Objective"</b>		
Transfer of rural electricity service to the private sector is not accomplished.	M	Provincial market studies will provide good estimates of size of the market, tariffs, and economical and financial valuation. Studies will be carried out by qualified consultants.
Insufficient number of qualified companies bid on tendered concessions.	S	Award of concessions will be based on ICB. Careful attention will be given in bid package preparation to profitability estimates, tariff methodology to award contract. Mount extensive solicitation effort for prospective investors.
Inadequate promotion of RES and no standards and certification procedures in place.	N	PGs and PRA will receive sufficient technical support for project promotion, implementation, and supervision.
No Acceptance by customers of WHS and unsatisfactory installation of WHS.	N	Promotion and education campaigns among rural customers will be carried out. Selection of site and installation will be carried out by international and qualified consultants and operators of wind systems.
Unsatisfactory performance of PRAs in regulatory functions for RES.	M	Training program will be adequately prepared and implemented.
All supported TA for strengthening the national power sector are not well implemented or implemented with delays.	M	Bank technical experts and international consultants will assist in solving TA implementation problems.
<b>Annex 1, cell "from Components to Outputs"</b>		
Lack of counterpart funds	S	Availability of FEDEI funds will be made a condition of the participatory agreement.
Lack of acceptance by the customers.	M	Promotion programs and customer satisfaction survey will be carried.
Inadequate design for the WHS pilot sub-project.	N	Qualified international firm with experience on design and operation of wind projects will be contracted.
All supported TA for barrier removal, training program, and strengthen the national power sector are not well implemented or implemented with delay.	M	Bank technical experts and international consultants will assist in solving TA implementation problems.
Poor performance of the PCU and PIU.	S	Bank will review institutional arrangements and adequate selection of consultants.
<b>Overall Risk Rating</b>	<b>M</b>	
<b>Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)</b>		

**3. Possible Controversial Aspects:**

At this stage, no controversial aspects are foreseen.

## **G: Main Loan Conditions**

### ***Agreements to be reached during negotiations:***

- PCU to be set up in accordance with TOR, (particularly, staffing and resources ) acceptable to the Bank;
- TOR for the consultant roster;
- TOR for the studies to be carried out at the national level;
- TOR for the studies to be carried out on renewable energy;
- TOR for the WHS pilot sub-projects;
- Dates to complete the execution of studies, to exchange views with the Bank on the conclusion and recommendations of such studies, and to provide to the Bank a plan of action, satisfactory to the GOA and the Bank, to implement such recommendations (see Annex 2, Table 2.4);
- Final draft of a model bidding document for selecting concessionaires;
- Final draft of a model concession contract for dispersed rural markets;
- Use of Bank's procurement guidelines in the case of existing concessionaires;
- Eligibility criteria for the proposed participating provinces (see Annex 2, Box 1);
- Terms and conditions of the subsidiary agreement to be signed between the SE, the CFE and the eligible PG, which would include:
  - a) conditions to transfer the Bank and GEF funds;
  - b) setting up of the PIU;
  - c) conditions for the participation for existing and new concessionaires;
  - d) accepting support from the PCU to prepare, supervise, and monitor the sub-project;
  - e) facilitating the executing of market studies;
  - f) agreement to set up tariff level and structure in accordance with tariff methodology agreed with the SE and the Bank;
  - g) securing the allocation of FEDEI funds to the project;
  - h) Compliance with environmental safeguards.
- performance indicators to be utilized for project monitoring;
- proper implementation timetable;
- submission of audit report (on project account, and Bank and GEF special account, and SOE of the Bank and GEF) no later than 6 months after the end of the fiscal year;
- submission of quarterly project progress reports, including an executive summary report and a report for each participating province;
- training program for the PG and PRA staff.

### ***1. Effectiveness Conditions:***

- the PCU is set up and functioning;
- Agreement between the SE and the procurement agent signed;
- final model bidding document and concession contract for the selection of new concessionaires are acceptable to the Bank;
- final standards bidding document for the procurement of goods to be installed by existing concessionaires acceptable to the Bank.
- Financial management system for the project is set up by the GOA.

**Conditions of disbursement for each participating province:**

- for receiving consultant services from PCU:
  - a) market study agreement satisfactory to the Bank, and
  - b) a PIU has been set up satisfactory to the Bank;
- for financing goods and services after concession agreement:
  - a) participation agreement signed by the concessionaire the PG and CFE, by which the former agrees to carry out the project following conditions acceptable to the Bank.
  - b) a concession agreement has been signed by the PG with a concessionaire.

**2. Other [classify according to covenant types used in the Legal Agreements.]:**

**H. Readiness for Implementation**

☒ The engineering design documents for the first year's activities are complete and ready for the start of project implementation. ☐ Not applicable.

☐ The procurement documents for the first year's activities are complete and ready for the start of project implementation. (Not applicable. It is a condition of effectiveness).

☒ The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.

☐ The following items are lacking and are discussed under loan conditions (Section G):

**I. Compliance with Bank Policies**

☒ This project complies with all applicable Bank policies.

☐ [The following exceptions to Bank policies are recommended for approval: The project complies with all other applicable Bank policies.]

**Ricardo Klockner**  
Task Team Leader

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Sector Management Director

**Myrna Alexander**  
Country Management Director

Project Design Summary

Narrative Summary	Key Performance Indicators	Monitoring and Evaluation	Critical Assumptions
<p><b>CAS Objective</b></p> <ul style="list-style-type: none"> <li>Promote private sector investment in power.</li> <li>Promote sustainable management of natural resources.</li> </ul> <p><b>GEF Objective</b></p> <ul style="list-style-type: none"> <li>Promote the adoption of renewable energy by removing market barriers and reducing implementation costs.</li> </ul>	<ul style="list-style-type: none"> <li>At least 10 provinces have privatized their rural market by 2004.</li> <li>Over 200 million kWh generated from PV systems by 2004.</li> <li>About 700 million liters of kerosene purchases avoided.</li> <li>Nearly 1.5 million tons of CO<sub>2</sub> emissions avoided.</li> </ul>	<ul style="list-style-type: none"> <li>Periodic Bank project supervision and mid-term review.</li> <li>Feedback from national/regional seminars for concessionaires, PRA staff and public.</li> </ul>	<ul style="list-style-type: none"> <li>GOA and PGs maintain their commitment to power sector reform; special attention is given to dispersed area electrification.</li> <li>Principal barriers to private sector investment in RES in dispersed rural areas of Argentina are removed by innovative project design.</li> </ul>
<p><b>Project Development Objectives</b></p> <ol style="list-style-type: none"> <li>Support strategic studies to strengthen the national power sector reform.</li> <li>Provide rural off-grid energy services in a sustainable manner.</li> <li>Support the GOA strategy to expand private sector participation in the provision of electricity in rural areas.</li> </ol>	<ol style="list-style-type: none"> <li>Studies completed by 2001.</li> <li>By 2000, 5 new concession contracts for dispersed rural market awarded; and 5 project implementation agreements by existing concessionaires signed.</li> <li>In 2004, at least 80,000 homes enjoy electricity services with SHS.</li> </ol>	<ul style="list-style-type: none"> <li>Project progress report submitted by the SE.</li> <li>Project mid-term review by year 2000.</li> </ul>	<ul style="list-style-type: none"> <li>Continued Government commitment to increase private sector participation.</li> <li>Provincial market studies provide good estimate of WTP and size of the market.</li> <li>Bidding documents to award concessions based on ICB will be comprehensive and detailed on potential market, tariffs, subsidies, standards for service installations.</li> </ul>

Narrative Summary	Key Performance Indicators	Monitoring and Evaluation	Critical Assumptions																		
<b>Project Outputs</b>  1. New concessionaires sign concession contracts with the PG and existing concessionaires sign project implementation agreements with the PG. 2. Promotion, installation and operation of reduced-cost RES by private sector concessions. 3. Installation and commercial operation of WHS. 4. Strengthened regulatory function and capability of PGs. 5. Private sector participation is expanded in the national power system	 1.1 5 concession contracts to provide RES in dispersed rural areas signed by 2000. 1.2 10 project implementation agreements signed by 2001; 2.1 By 2000, about 11,000 SHS, and 1,800 PV systems for public centers installed and operational. 2.2 By 2004, about 100,000 SHS installed and 2800 PV systems for public centers installed and operational 2.3 By 2004, about 11 MW installed in RES . 3.1 By 2000, pilot individual WHS successfully proven. 3.2 Consumer satisfaction with WHSs. 4.1 By 2004, regulation of dispersed rural market has become a routine function of PRA. 5.1 TA completed by 2001 and implemented accordingly.	 • Bank supervision reports. • Progress reports by SE. • PRA annual reports. • Concessionaire annual reports. • Mid-term review. • Survey on consumer satisfaction with WHS.	 1.1 Satisfactory transfer of rural electricity service responsibility to the private sector. 1.2 Sufficient number of qualified companies bid on tendered concessions 2.1 Adequate promotion of RES and standards and certification procedure are in place. 3.1 Satisfactory installation and operation of WHS and well accepted WH by the customers 4.1 PRAs perform regulatory functions for RES satisfactorily 5.1 TA for strengthening national power sector implemented well in time.																		
<b>Project Components</b>  1. Electricity generating equipment for rural markets. 2. Two (2) pilot sub-projects based on WHS. 3. Capacity Building Program. 4. Project administration. 5. Front and fee	<b>Inputs of IBRD and GEF funds according to schedule</b> <table><tr><td></td><td>Bank US\$ million</td><td>GEF</td></tr><tr><td>1. Electricity generating equipment for rural markets.</td><td>40.1</td><td>9.4</td></tr><tr><td>2. Two (2) pilot sub-projects based on WHS.</td><td>0.0</td><td>0.4</td></tr><tr><td>3. Capacity Building Program.</td><td>2.5</td><td>2.8</td></tr><tr><td>4. Project administration.</td><td>3.4</td><td>1.4</td></tr><tr><td>5. Front and fee</td><td>0.5</td><td></td></tr></table>		Bank US\$ million	GEF	1. Electricity generating equipment for rural markets.	40.1	9.4	2. Two (2) pilot sub-projects based on WHS.	0.0	0.4	3. Capacity Building Program.	2.5	2.8	4. Project administration.	3.4	1.4	5. Front and fee	0.5		 • Bank supervision reports. • Progress reports by SE. • Concessionaires annual reports. • Mid-term review.	 1.1 Availability of counter funds 1.2 Acceptance of RES by customers 2.1 Adequate design of the WHS pilot sub-project 3.1 All supporting TA for barrier removal, training program, and strengthen the national sector implemented well in time 4.1 Satisfactory performance of the PCU and PIUs
	Bank US\$ million	GEF																			
1. Electricity generating equipment for rural markets.	40.1	9.4																			
2. Two (2) pilot sub-projects based on WHS.	0.0	0.4																			
3. Capacity Building Program.	2.5	2.8																			
4. Project administration.	3.4	1.4																			
5. Front and fee	0.5																				

### Key Performance Indicators

[illegible]

<sup>1</sup> A: Bank supervision report; B: Quarterly Project Progress Report; C: Annual Concessionaire's report; D: PRA Annual report; E: Bank's Disbursement records

<sup>2</sup> To be measured and monitored each year.

Objective	Performance Indicators	Year End				Document <sup>1</sup>
		1999	2000	2001	2,002	2,004
A. Strengthen the Federal Regulatory Function	<ul style="list-style-type: none"> <li>• Study to review how DC appliances in the market match with SHS requirements               <ul style="list-style-type: none"> <li>⇒ Completed</li> </ul> </li> <li>• Workshop for dispersed market concessionaires               <ul style="list-style-type: none"> <li>⇒ Number of workshops for customers<sup>2</sup></li> <li>⇒ Number of workshops for concessionaires<sup>2</sup></li> </ul> </li> </ul>			06/31/01  03/31/01 06/31/01		
	<b>Technical Assistance</b> <ul style="list-style-type: none"> <li>• Study to increase competition in Transmission and distribution               <ul style="list-style-type: none"> <li>⇒ Completed</li> <li>⇒ Implemented</li> </ul> </li> <li>• Preparation of a catalog of hydro projects               <ul style="list-style-type: none"> <li>⇒ Completed</li> <li>⇒ Implemented</li> </ul> </li> <li>• Revision of policy on Efficient use of Energy               <ul style="list-style-type: none"> <li>⇒ Completed</li> <li>⇒ Implemented</li> </ul> </li> <li>• Setting up a national strategy on renewable energy technology               <ul style="list-style-type: none"> <li>⇒ Completed</li> <li>⇒ Implemented</li> </ul> </li> <li>• Study on export energy options               <ul style="list-style-type: none"> <li>⇒ Completed</li> <li>⇒ Implemented</li> </ul> </li> <li>• Environmental assessment of the energy sector and definition of a strategy for the power sector               <ul style="list-style-type: none"> <li>⇒ Completed</li> <li>⇒ Implemented</li> </ul> </li> </ul>	12/31/99	03/31/00  12/31/00	06/30/01 09/30/01   03/31/01	03/31/02	

### **Detailed Project Description**

The Project would cover the provision of electricity service by private concessionaires to the dispersed rural market for lighting and communications. The project will be implemented in 10 provinces, after signing a subsidiary agreement with the SE. These provinces have reformed the power sector and most of them have privatized their concentrated electricity market (see Attachment 1).

The potential number of customers and equipment of each province will be defined during project implementation based on detailed market studies.

#### **Project Component 1. Electricity Generating Equipment for Rural Markets**

- **Component 1.A - Equipment to be installed by existing concessionaires - US\$ 94.6 million (total cost of the component)**
  - a) Installation of about 55,300 solar home systems (SHS) in individual households in the provincial rural market, according to the breakdown detailed in Table 2.1. The installation of these equipment will not require justification by a least cost study.

<b>Table 2.1 Installation of SHS</b>			
<b>Cost in US\$ million</b>			
<b>Type</b>	<b>Number of Units</b>	<b>Cost estimate</b>	
<b>PV50 Wp to 100 Wp</b>	<b>46,200</b>	<b>51.1</b>	
<b>PV150 Wp to 400 Wp</b>	<b>12,100</b>	<b>30.1</b>	
<b>Total</b>	<b>55,300</b>	<b>81.2</b>	

- b) Installation of decentralized energy supply for the provision of electricity to about 3,100 household living in small communities (15-50 households each). This equipment may include mini-hydro plants, wind turbines, diesel plants, or hybrid plants (diesel/wind, diesel/solar, or solar/wind). The total cost is estimated at US\$2.8 million. The concessionaire should demonstrate to the PG that the alternative selected is the least cost solution.
    - c) Installation of about 2,000 decentralized electricity supply systems in provincial public service institutions (public schools, medical centers, police stations, public agencies). The cost is estimated at US\$10.6 million. The concessionaire should demonstrate to the Bank that the alternative selected is the least cost solution.
- **Project Component 1.B - Equipment to be installed by new concessionaires - US\$77.9 million (total cost of the component)**
  - a) Installation of about 46,600 solar home systems (SHS) in individual households in the provincial rural market, according to the breakdown detailed in Table 2.2.

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<sup>1</sup> All figures include physical and price contingencies

**Table 2.2 Installation of SHS**

Type	Cost in US\$ million Number of Units	Cost estimate
PV50 Wp to 100 Wp	38,600	43.2
PV150Wp to 400 Wp	8,000	27.4
Total	46,600	70.6

b) installation of decentralized energy supply for the provision of electricity to about 2,800 household living in small communities (15-50 households each). This equipment may include mini-hydro plants, wind turbines, diesel plants, or hybrid plants (diesel/wind, diesel/solar, or solar/wind). Total cost is estimated at US\$2.6 million. The concessionaire should demonstrate to the PG that the alternative selected is the least cost solution.

c) Installation of about 900 decentralized electricity supply systems in provincial public service institutions (public schools, medical centers, police stations, public agencies). The cost is estimated at US\$4.7 million. The concessionaire should demonstrate to the Bank that the alternative selected is the least cost solution.

**Project Component 2 - Two (2) Pilot sub-projects based on Wind Home System (WHS) - US\$0.6 million**

- Installation and operation of WHS Units (50Wp each) in two rural communities of no more than 100 household each. The sub-projects will be implemented by consultants/suppliers under turnkey contracts comprising site selection, engineering services, supply and installation of the equipment in the households and related operational services, with cooperation by the concessionaires, if any, in the selected provinces. This pilot sub-project is expected to demonstrate the commercial viability and long-run economic potential of wind home systems, consisting of small turbines for individual homes in Argentina, and to catalyze future development by private investors. The WHS pilot subproject will be located in the provinces of Santa Cruz and Rio Negro, where there are sufficient proven wind resources. The exact location of the pilot subprojects will be decided during project implementation. TOR were agreed during appraisal and are included in the project file.

**Project Component 3 - Capacity Building - US\$6.6 million**

This component includes two types of technical assistance (TA) and a training program as follows:

- a) TA to assist the GOA to strengthen the reform of the power sector. The scope of this TA was agreed during appraisal, and it is included in attachment 2. Final TORs should be agreed before December 31, 1998.

The following table shows the cost estimate of the TA for the SE:

Table 2.3: Cost Estimate of the TA (thousand US\$)					
	1998	1999	2001	2002	Total
Study to increase competition in transmission and distribution activities		148	194	58	400
Preparation of a catalog of hydro projects		50	75	75	200
Revision of policy on Efficient Use of Energy		100	100		200
Setting up a national strategy on renewable energy technology					150
Study on export energy option		228	395	127	750
Environmental assessment of the energy sector and definition of a strategy for the power sector		75	75		150
Panel of International experts on regulation		91	59		200
<b>Total cost estimate</b>		<b>942</b>	<b>898</b>	<b>260</b>	<b>2,150</b>

b) TA to assist the GOA in building an institutional capability for the promotion and dissemination of RES technology and, specifically, SHS systems. TORs were agreed during appraisal and are described in the PIP filed in the Project File. This TA includes the following activities:

- **Detailed market structure studies.** The objective of this TA is to evaluate and define the market structure to be given in concession. Scope of the TA: (i) carry out a market study; (ii) carry out surveys on willingness to pay for the electric service; (iii) set the tariff scheme based on the methodology agreed with the Bank; (iv) carry out an economic and commercial evaluation study; and (v) assess market risks.
- **Standards and certification for photovoltaics systems, components, and installation procedures.** The objective of this TA is to create an ongoing, local system to establish PV system performance standards and certification procedures that ensure the efficient, reliable and rational development of solar photovoltaic home systems in Argentina. While the accreditation and certification requirements would be to global standards, they would be administered by the designated in-country administrative organization, which would participate on a global and regional basis with other country and regional member organizations.
- **Promotion and public education campaign.** The objectives of this TA are to: i) define the informational, educational and promotional needs of the project; ii) design specific promotional programs for the national and provincial levels; iii) prepare the necessary educational and training materials; and iv) execute the programs. These activities will be performed primarily by consultants, PRA and concessionaire staff, and managed at the national level by the PCU.
- **Feasibility studies for centralized renewable systems.** The objectives of this TA are to: i) develop a methodology for analyzing technical and economic feasibility and relative merits of various small-power systems for rural communities/semi-dispersed population; ii) to apply the methodology and perform feasibility studies for approximately 10 sites which would include estimated cost-effectiveness of various power systems alternatives, system designs and specifications, revenue projections, subsidy requirements if any, and estimated power consumption; iii) to develop local small-scale power system

engineering, site evaluation, project design, environmental assessment (if required), and equipment selection capabilities in the private sector.

- **Study to review how the available DC appliances in the market match with SHS requirements.** This TA will help address the perceived problem which results from many non-electrified dispersed area households in Argentina expressing a preference for grid or diesel electricity due to wider availability of AC appliances and lack of understanding of the capability of PV systems. The TA will specifically help to assess the current availability of DC appliances and determine the requirements to ensure that appropriate DC appliances will be available in rural areas once SHSs and other RES are in place. The consultants will review the types of high efficiency DC appliances already available commercially in international markets, match types of appliances with SHS capacity, and recommend options for marketing these appliances in dispersed rural areas.
- **Database to improve the solar resource information** The objective is to selectively assess and characterize Argentina's solar resources, and strengthen local capacity to perform sophisticated solar resource assessments. The resource assessment will focus on three factors: i) Improve quality and spatial resolution of solar resource measurements; ii) Perform specific studies to better understand existing data and assessments which have been performed; and iii) adapt the data and information generated by this sub-component to a format immediately relevant to and useful for the private sector.
- **Database to improve wind resource information** The objective is to selectively assess and characterize Argentina's key wind resource regimes, and strengthen local capacity to perform sophisticated wind resource assessments. A wind energy atlas of the selected regimes will be created using advanced Geographic Information Systems software and specialized computer techniques for mapping the distribution of those resources. The output of this work will assist the current project for rural electrification, and inform larger scale application of rural and centralized wind power investments in the future. Training and equipment will be procured to contribute to these objectives and to enhance the existing local capacity and infrastructure for ongoing wind power assessment.
- **Workshops for dispersed market concessionaires** The objectives of this TA are: i) to enhance the quality and number of potential participants to the concession process through a series of workshops and related information exchange activities at the initial stage of the process, and at certain stages of the implementation process, enable a meaningful dialogue and exchange of experience among private sector concessionaires in the different provinces and the GOA on the progress of implementation. This activity will include a series of workshops directed at prospective and existing concessionaires for dispersed areas. It will also include consultant services to help design the workshops, identify participants and, if necessary, facilitate the conduct of the workshops themselves. The number, location, and specific content of each workshop will be elaborated later.

**Table 2.4: Cost Estimate of the TA on Renewable Energy (US\$ Thousand)**

Subject	1998	1999	2000	2001	2002	2003	Total
Detailed market structure studies	200	300	100				600
Standards and certification for photovoltaics systems, components and installation procedure	78	144	78				300
Promotion and public education campaign	120	269	169	85	70	37	750
Feasibility studies for centralized renewable systems		139	152	71	38		400
Database to improve the solar resource information		43	127	30			200
Database to improve wind resource information		94	122	34			250
Study to review how the available DC appliances in the market match with SHS requirements		59	90	51			200
Workshops for dispersed market concessionaires	22	407	161	44	44	22	700
<b>Total</b>	<b>420</b>	<b>1455</b>	<b>999</b>	<b>315</b>	<b>152</b>	<b>59</b>	<b>3,400</b>

The execution of the studies described above in a) and b), with the assistance of consultants, and the implementation of the recommendations of such studies after exchanging views with the Bank, should be completed no later than the dates specified below.

**Table 2.5: Schedule of the TA**

Brief description	Technical assistance completed not later than	Implementation of Study not later than
<b>TA on National Power Sector Reform</b>		
Study to increase competition in transmission and distribution activities	June 30, 2001	September, 2001
Preparation of a catalog of hydro projects	December 31, 1999	March 31, 2000
Revision of policy on Efficient Use of Energy	December 31, 2000	March 31, 2001
Setting up a national strategy on renewable energy technology	June 30, 1999	September 30, 1999
Study on export energy options	December 31, 2001	March 31, 2002
Environmental assessment of the energy sector and definition of a strategy for the power sector	June 30, 1999	September 30, 1999
Panel of International experts on regulation	When required	When required
<b>TA on Renewable Energy</b>		
Detailed market structure studies	When required	3 months after completion
Standards and certification for photovoltaics systems, components and installation procedures	March 31, 1999	June 30, 1999
Promotion and public education campaign	NA	NA
Feasibility studies for centralized renewable systems	When required	3 months after completion
Database to improve the solar resource information	March 31, 2001	
Database to improve wind resource information	March 31, 2001	
Study to review how the available DC appliances in the market match with SHS requirements	March 31, 2001	
Workshops for dispersed market concessionaires	N.A.	N.A.

- c) *A training program* to strengthen the capability of the PRA of the 10 provinces participating in the project. This program aims at improving their knowledge of technical, economic, financial, and institutional aspects of SHS and other types of RES, so they can effectively assist the concessionaires in achieving their service provision goals. This training program would be organized through local seminars and short study tours to foreign countries as described below:
- i) *Two-to-three-day intensive regional training sessions*, to be administered by the PCU and designed by consultants. Each regional session will include regulators from 4-5 provinces. Instructors will be a mix of local and international experts. Topics to be covered will include technical aspects (e.g., sizing of SHS), economic and financial analysis (e.g., economic comparison of centralized vs. individual systems), and understanding international standards and certification practices. The first provincial workshops will be developed and executed within the first 6 months after project effectiveness; and
  - ii) *Short study tours* to neighboring and other countries where similar RES installations and projects are being implemented. The tours will be narrowly focused to technologies and systems being used in Argentina. Participants will be selected regionally and upon return will disseminate their experience to other regulators in formal seminars to be organized by the PCU. Study tours abroad will be held on staggered basis over a period of two years, with at least one regulator in each province participating.

The following Table shows the cost estimate of the Training program:

	1998	1999	2000	2001	Total
Seminars		90	75	50	215
Short study tours		60	60		120
Experts		159	127	159	445
Training materials	50	120	50		220
Total	50	429	312	209	1,000

#### **Project Component 4 – Project Administration – US\$7.0 million**

This component includes a TA for project implementation services. The TORs were agreed during appraisal and will be confirmed during negotiations, and are included in the project file.

- a) *The PCU.* The PCU will be responsible for the general coordination of the project. The PIP includes a detailed description of its staffing (management, monitoring, and supervision functions).
- b) *Consultant Roster.* A roster of consultant experts, in legal, commercial, institutional, environmental and renewable energy technology will be available to assist the PGs and PRAs during project implementation. The consultants roster will be hired by the PCU, and it will provide consultant services to PCU, PGs and PRA on request, specifically in preparing the provincial sub-projects for private sector participation, including market evaluation, bidding process for dispersed concessions, tariff and subsidy calculation, concession contract, and other subjects. The number of consultants will be decided during project implementation.
- c) *The provincial PIU.* The PRA in each of the participating provinces will be in charge of project preparation, coordination, and supervision. The PIU will be composed of a provincial

coordinator, financed by the Bank loan and the GEF grant, and provincial government staff from other PIU. The cost of the PIU includes fees and travel expenses of the project coordinator.

- d) *Procurement Agent.* A procurement agent would be contracted to manage the hiring and paying of consultants, to reduce delays associated with procurement. This arrangement has worked relatively successfully in other countries, in most cases using UNDP as a procurement agent. The cost of procurement services has been estimated at about 4 percent of the amount of the capacity building component cost.

Table 2.7: Cost Estimate of the TA for Project administration (US\$ Thousand)							
	1998	1999	2000	2001	2002	2003	Total
PCU	360	841	811	418	285	285	3,000
Consultant Roster	149	149	104	74	74		550
Provincial PIU	110	907	633	550	550	550	3,300
Procurement Agent	50	80	20				150
<b>Total</b>	<b>669</b>	<b>1,977</b>	<b>1,548</b>	<b>1,042</b>	<b>909</b>	<b>835</b>	<b>7,000</b>

**Box 1**

**Eligibility Criteria for the Province**

**General Criteria**

In order to ensure full compatibility with project's objective in the provinces, it is essential that the eligibility criteria be fully accepted by all provincial institutions to be involved in sub-project implementation. These basic criteria are:

- The PG should have put in place a new electricity regulatory framework for the provincial power sector, allowing private sector participation in operation activities;

**Box 2:**

**Specific Criteria:**

**Part A: Provinces with an existing Concession**

**The PG should be willing to:**

- sign a participation Agreement with the SE and the CFE acceptable to the Bank, by which the PG and the CFE accepts the conditions stated in the Bank Loan and GEF Grant agreements;
- sign a concession Agreement I with the existing concessionaire of the concentrated market, by which the latter agrees to implement the project;
- revise the concession contract, in order to adapt the tariff structure and level to the methodology stated in the Bank loan and GEF grant agreement;
- allow the concessionaire to buy the generating equipment according to the Bank's procurement guidelines.
- amend the concession contract, in case the concessionaire does not accept to participate in the project, in order to allow the participation of a new concessionaire in the provision of electricity to the dispersed rural market.

**Box 3:**

**Specific Criteria:**

**Part B: Provinces with new Concessions**

**The PG should be willing to:**

- sign a participation Agreement with the SE and the CFE acceptable to the Bank, by which the PG and the CFE accepts the conditions stated in the Bank Loan and GEF Grant agreements;
- award the concession of the rural market using the conditions stated in the model bidding documents and concession contract proposed by the PCU;
- accept the tariff structure and level to the methodology stated in the Bank loan and GEF grant agreement;
- Sign a concession Agreement II with a new concessionaire by which the latter agrees to implement the project.
- allow the concessionaire to buy the required equipment following its own procurement rules.

**Box 4**

**Main Conditions to be included in the Participation Agreement**

The PG and the CFE should sign a Participation Agreement with the SE, by which:

**(a) The PG agrees to:**

- set a implementation unit (PIU);
- establish a regulatory framework for the provision of electricity to the dispersed rural market;
- sign a concession Agreement with the concessionaire,
- carry out the project under terms and conditions satisfactory to the Bank.
- carry out a dissemination and educational program among the rural customers;
- instruct the PRA to verify compliance with the provisions of the concession contract by the concessionaire, and carry out certification procedures.

**(b) The CFE agrees to:**

- complete the initial financial gap of the sub-project by transferring FEDEI funds to the PG.

**Box 5**

**Conditions to be complied by the Concessionaire**

Sign a concession agreement with the PG, by which the concessionaire agrees to implement the project, including environmental safeguards, in accordance with the conditions stated in the Bank Loan and GEF Grant agreements.

Table 5.9: EXPECTED PARTICIPATING PROVINCES

Province	Concentrated Market (CM)		Dispersed Rural Market (DRM)			
	Regulatory Framework of the CM	Status of the Power Utility	Regulatory Framework of the DRM	Privatization	Customers <sup>2</sup>	Investment
Corrientes	Provincial Electricity law (PL) L #4921 dated 6/5/95 is consistent with NEL	The PL allows the privatization of the power utility. It is expected to be privatized during 1997.	PL allows the creation of the DRM		R: 19,500 PS: 380	31.3
Entre Rios	PL # 8916 dated 8/18/95 is consistent with NEL	EDEERSA: 90% privatized in May/96. Consortium: Astra, Bco. Galicia & others.	EDEERSA is entitled to provide electricity service to the DRM.		R: 14,708 PS: 190	22.0
Formosa	PL #1081 dated 2/16/94 partially complies with NEL. Tariff structure doesn't is not consistent with costs.	EDEFOR: 90% privatized in Jan/95. Consortium: IATE and others.	EDEFOR is entitled to provide electricity service to the DRM		R: 13,395 PS: 238	20.4
Jujuy	PL # 4904 & #4888 dated 3/14/96 is consistent with the NEL	EJESA - 90% privatized; Consortium: CGE, EDET & Carillone		EJEDSA: a subsidiary of EJESA. Same consortium as of CM.	R: 2,200 PS: 114	3.8
La Rioja	PL # 6030 dated 1/9/95	EDELAT: 90% Privatized; Consortium: EXXEL (90%) & Unión Fenosa (10%)	The PL created the DRM to be provided by any concessionaire	Bidding process for a new concession of the DRM is under way	R: 2,206 PS: 152	4.0
Mendoza	PL #6497 dated May/97 is consistent with NEL	EMSE is expected to be privatized during the second semester of 1998.	EMSE is entitled to provide electricity service to the DRM		R: 2,176 PS: 19	3.4
Misiones	PL #3270 dated 1/2/96 is consistent with NEL	EMSA is expected to be privatized in 1998.	Any new concessionaire may provide electricity service to the DRM.		R: 23,887 PS: 238	34.1
Rio Negro	PL # 2902 dated 10/10/95 is consistent with NEL	EDERSA: 90% privatized in Aug/96. Consortium: SAESA (50%), Camuzzi (30%), Cilcorp (10%), & Cla. Arg. Cemento Portland (10%)	Any new concessionaire may provide electricity service to the DRM.		R: 2,574 PS: 105	5.5

<sup>2</sup> R: Residential; PS: Public Service

**Table 5.9: EXPECTED PARTICIPATING PROVINCES**

Province	Concentrated Market (CM)		Dispersed Rural Market (DRM)			
	Regulatory Framework of the CM	Status of the Power Utility	Regulatory Framework of the DRM	Privatization	Customers <sup>2</sup>	Investment
San Luis	PL #4966 of 1992 partially complies with the NEL. Tariff level is high and its structure is not in line with the costs. In 1998, the tariff level will be reviewed.	EDESAL: 100% privatized in March/96. Consortium EXCEL & Unión Fenosa	EDESAL is entitled to provide electricity service to the DRM.		R: 3,161 PS: 238	5.9
Santiago del Estero	PL #6054 dated 5/25/94 is consistent with NEL.	EDESE-90% Privatized in Jan/95. Consortium: Houston Light (100%)	EDESE is entitled to provide electricity service to the DRM.		R: 25,004 PS: 1,188	42.2



1000

**Estimated Project Cost**

Project Component	Local	Foreign US\$ Million	Total
<b>1. Electricity generating Equipment for Rural markets</b>	<b>38.8</b>	<b>99.8</b>	<b>138.6</b>
1.A Equipment to be installed by an existing concessionaire	<b>21.2</b>	<b>54.6</b>	<b>75.8</b>
a) SHS in individual houses	18.0	46.4	64.4
b) RES in collective villages	0.6	1.5	2.1
c) RES public service agencies	2.6	6.7	9.3
1.B Equipment to be installed by new concessionaires	<b>17.6</b>	<b>45.2</b>	<b>62.8</b>
a) SHS in individual houses	15.8	40.7	56.5
b) RES in collective villages	0.6	1.5	2.0
c) RES public service agencies	1.2	3.0	4.2
<b>2. Two (2) pilot sub-projects based on WHS</b>	<b>0.2</b>	<b>0.4</b>	<b>0.6</b>
<b>3. Capacity Building</b>	<b>3.9</b>	<b>2.7</b>	<b>6.6</b>
a) For the power sector	0.7	1.5	2.2
b) For developing RES	2.3	1.1	3.4
c) Training	0.9	0.1	1.0
<b>4. Project Administration</b>	<b>6.6</b>	<b>0.4</b>	<b>7.0</b>
a) PCU	3.0	0.0	3.0
b) Consultant Roster	0.2	0.4	0.6
c) PIU	3.3	0.0	3.3
d) Procurement Agency	0.1	0.0	0.1
<b>5. Front end fee</b>		<b>0.5</b>	<b>0.5</b>
<b>Total Baseline Cost</b>	<b>49.5</b>	<b>103.8</b>	<b>153.3</b>
Physical Contingencies	5.2	15.0	20.2
Price Contingencies	3.8	9.9	13.7
<b>Total Project Cost</b>	<b>58.5</b>	<b>128.7</b>	<b>187.2</b>

Document  
File-Name

Project App  
Summary

Project

Project

Project

Electricity generating equipment  
to be installed by  
a) SHS in individual houses  
b) SHS in collective villages  
c) SHS public service agencies

Equipment to be installed by new  
a) SHS in individual houses  
b) SHS in collective villages  
c) SHS public service agencies

0.6  
1.2

For the power sector  
For developing SHS  
Training  
Project Administration  
PCU  
Construction  
SHS

1.0	0.1	0.9
7.0	0.4	6.6
3.0	0.0	3.0
0.8	0.4	0.4

103.8  
103.8

Physical Counting  
Use Counting

0.01  
0.01



## Economic Analysis

### Economic Benefit Summary

1. The rural market of the project is composed of rural consumers and public institutions of 10 participating provinces. Each province represents a market to be privatized. Data from market surveys in five representative provinces are used to determine costs and benefits in the 10 provinces. Costs and benefits account for differences in the geographic and socio-economic characteristics of the 10 provinces that are reflected in different levels of solar radiation (impact on SHS costs), number and dispersion of rural consumers (impact on operating and maintenance costs), number of rural public services, and income of rural consumers (impact on the size of SHS, on the level of subsidies, and on willingness to pay for the service). The net benefit of the 10 provinces are aggregated to derive the Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) of the project. The NPV is calculated with an annual discount rate of 10 percent.

The EIRR and NPV of the individual provinces and total project are summarized in Table 4.1.

**Table 4.1 Economic Analysis Results Summary**

Provinces	Total number of customers	EIRR (%)		Economic NPV (000's US\$) with GEF	Economic NPV (000's US\$) without GEF	Representative Market
		with GEF	without GEF			
Santiago del Estero (*)	25,004	10.1	7.8	64	-2,173	25,000 customers
Misiones	23,887	10.8	8.4	561	-1,211	customers
Corrientes (*)	19,500	14.3	11.8	2,970	1,323	20,000 customers
Entre Rios (*)	14,708	12.8	10.2	1,262	118	15,000 customers
Formosa	13,395	12.4	9.9	1,014	-49	customers
San Luis (*)	3,160	12.3	9.8	285	-28	3,000 customers
Rio Negro	2,574	13.1	10.6	372	78	2,000 customers
Mendoza (*)	2,176	14.0	11.4	278	111	
Jujuy	2,320	12.7	10.5	254	53	
La Rioja	2,206	12.5	10.0	216	3	
<b>Total Project</b>	<b>108,930</b>	<b>12.0</b>	<b>9.6</b>	<b>7,276</b>	<b>-1,775</b>	

Provinces marked (\*) were used as representative markets in the financial analysis.

2. The EIRR of the project with GEF participation is about 12.0 percent yielding a NPV of economic benefits of about US\$7.28 million. The EIRR and NPV amounts vary by province from a low 10.1 percent EIRR (almost zero NPV) in Santiago del Estero, to a high 14.3 percent EIRR (US\$2.97 million NPV) in Corrientes. The EIRR of the project without GEF participation drops to 9.6 and yields a negative NPV of economic benefits of about US\$1.78 million. Santiago del Estero and Misiones are the provinces most affected by removing GEF participation. Consequently, GEF participation makes the project economically feasible.

### Economic Analysis Approach

3. The basic approach is as follows.

**Technology choice.** A set of RES technologies and conventional alternatives were defined for project support. These include SHS of sizes 50, 70, 100, 150, 200, 250, 300 and 400 Wp; as well as solar village systems, wind and small-hydro units, and conventional diesel units where RES are uneconomic and WTP is adequate to support economically required levels of utilization of the diesel system.

**Operating characteristics,** capital and operating costs, energy output and environmental impact characteristics were defined by SE and reviewed and agreed to by the WB. Capital costs used for economic analysis consist of CIF cost of SHS delivered to Argentina, plus local transport and installation. These costs exclude customs duties and value added taxes.

**Province Characteristics.** The project is designed to reach 10 provinces consisting of a total of 101,869 individual customers plus 5,949 collective systems and 2,862 public systems. These provinces fall into 5 distinct socio-economic and geographic regions. These characteristics affect the project in a number of very important ways, including their impact on household income and ability to pay for new SHS's, dispersion of population and cost of delivery of electricity services, and solar insolation and the output achieved by given systems. These regions are described in Table 4.2 below.

**Table 4.2 Socio Economic Characteristics of Regions**

Geographic/Socio Economic Category	Region Characteristics
Noroeste	Mixed economy-agricultural, cattle raising, mining, forestry, tourism and industry. Less developed rural zones dependent on traditional agricultural economy. Santiago del Estero and Jujuy belong to this region. Santiago del Estero contains the largest number of non-electrified households of relatively high level of poverty (NBI, <i>Necesidades Básicas Insatisfechas</i> )
Sierras Pampeanas	Diverse geography-mountains, valleys, planes; with widely scattered population settlements, scarce water resources. La Rioja, San Luis y Rio Negro are in this region.
Mesopotamia	Eastern region with unique geography including forests and distinct economic activity involving subtropical agricultural, grain production and cattle. Corrientes, Misiones and Entre Rios are in this region.
Noreste	Region has agricultural, and silvo-cultural-cattle industry based economy, characterized by subtropical agriculture and forest exploitation. Region of country most recently populated. Highest level of poverty nationally (highest NBI). Formosa is in this region.
Cuyo	Western region characterized by irrigated agricultural and vineyard; other important economic activity includes mining, petroleum and tourism. Mendoza is in this region.

**Market penetration.** Studies of RES's for each province were estimated by the SE. It should be noted that the 10 provinces differ significantly not only in size, but in economic activity and geography. For this reason, it was necessary to estimate for each province either WTP or "current actual fuel cost" for benefit analysis purposes. A refinement in this analysis which was not feasible at this time would be to also adjust the sizes of respective SHS's for the differences in provincial solar radiation.

**Economic benefits.** Benefits for RES's are based on the estimated consumer benefit from use of these systems. Two options are considered for estimating benefits.

- Current energy expenditures (i.e. current actual fuel cost) for lighting and social communication. They are an estimate of the relative value consumers actually place on energy services similar to those being provided by traditional fuels prior to electrification by RES's.
- Willingness to pay (WTP) by the consumer for different sizes of SHS. WTP is an estimate determined by field surveys in the provinces.

The first option, current energy expenditures, was uniformly found to be higher than reported WTP (see Table 4.5). It was determined to be a truer measure of actual benefits and used as the baseline for economic analysis. The WTP option is subject to greater uncertainty simply due to the difficulty in accurately measuring its value. Although WTP gives a somewhat distorted picture of benefit of electricity service, it does correctly represent the consumers' ability and willingness to purchase this particular technological alternative at this time. Nonetheless WTP is a good indicator of potential market penetration for RES's and should be a major consideration in tariff setting. Using current energy expenditures as benefit measure results in a underestimation of total benefits. They neglect other, more intangible benefits of RES such as consumer surplus, reduction in local pollution and most importantly, a much higher quality of lighting. Therefore, an adjustment in current energy expenditures, our primary measure of project benefit, was made for systems between 50-150 Wp consisting of a simple 15% increase in actual energy expenditure figures. While arbitrary, this amount is considered a conservative estimate of the additional benefit due to consumer surplus, and in any case is within the error range of the estimates. Finally, actual expected tariff charges for systems greater than 150 Wp were used as the benefit measure.

*Environmental benefits* were not directly estimated but were assumed, following Bank and GEF practice, to be the "willingness to pay" of the international community for reduction in global CO2 emissions. In other words, environmental benefits are equal to the GEF contribution to the project. This is clearly a conservative estimate, as national willingness to pay for global reductions of CO2 emissions is not included, nor are the benefits of non-CO2 greenhouse gases. Including those environmental benefits in the economic analysis raises the project EIRR from 9.6 to 12%.

*Analytical model.* The model consists of a basic framework to allow analysis of project investment flows and operating costs on a lifecycle basis for RES and other technologies, (SHS's, wind household systems, diesel/PV hybrids, and small hydro, as well as conventional diesel and other project expenditures). In the calculation of the EIRR and NPV, lifecycle costs less salvage value at the end of 15 year project cycle were netted against the project benefits. (Spreadsheets of calculations made with this economic model are available in the project file.)

The data for the economic analysis of the project relies heavily on estimated consumer benefit information from GOA studies, consisting of WTP estimates and estimated actual energy expenditures. The base case utilizes estimated current actual monthly energy expenditure data for household lighting and social communication (e.g. radio, tape recorder, television) from the SE "5 Province Study" and other surveys conducted by SE as a basis for household benefit estimates. The estimated WTP are used for sensitivity analysis. The actual expenditures on fuel appear to be a better reflection of actual consumer benefit for energy use for economic analysis, since these measure actual consumer expenditures. At the same time, for purposes of tariff and subsidy policy, the WTP information is important because it attempts to determine the consumer valuation of this specific new source of energy, as well as the terms and conditions under which it will be offered. (See Anex 6, Financial Analysis Summary)

### Base Case Assumptions and Results

5. The base case assumptions for the economic analysis in terms of number of users, total kWp of system capacity by province, market share and distribution by category of customer is shown in Table 4.3 below. It assumes GEF participation. Additionally, Table 4.4 indicates the estimated CIF cost of the SHS, and Table 4.5 relates the estimated market share of different sizes of SHS, WTP for SHS, current energy expenditures, and range of customer tariff to the income of the provincial rural consumers. The environmental benefit is assumed equal to the GEF contributions to the project or \$14.0 million. Benefits from RES electricity use are valued at actual current fuel expenditures increased by 15% for consumer surplus/higher quality of service (systems 50Wp, 70Wp and 150 Wp) and for systems 200Wp and greater are set equal to the estimated full cost tariff (estimated by SE by province size). The project is assumed to induce additional future demand of 10% of the average of the projects last two years installations. Future demand induced by the project is valued at the same level per system as discussed above, however costs are excluded since they are not project dependent. A 10 percent discount rate is used in NPV calculation. The results are presented in Table 4.1 and described in para.2 above.

**Table 4.3 Provincial Markets**

	Customers	Capacity (kWp)	Market Share	Households	Public Service	Collective Service
TOTAL	110,680	10,675	kWp (%)	101,869	2,862	5,949
Jujuy	2,320	237	2.2%	2,086	114	120
Misiones	23,125	2,090	19.6%	21,647	238	1,240
Corrientes	19,880	1,943	18.2%	18,460	380	1,040
Rio Negro	2,679	347	3.3%	2,434	105	140
Mendoza	2,195	197	1.8%	1,947	19	229
San Luis	3,399	369	3.5%	2,990	238	171
Formosa	13,633	1,254	11.7%	12,666	238	729
Entre Rios	14,898	1,348	12.6%	13,908	190	800
La Rioja	2,358	252	2.4%	2,086	152	120
Santiago del Estero	26,192	2,638	24.7%	23,644	1,188	1,360

**Table 4.4 Estimated CIF Cost of Solar Home Systems (US\$)**

	SHS Size							
	50Wp	70Wp	100Wp	150Wp	200Wp	250Wp	300Wp	400Wp
Cost	550	773	970	1,362	1,731	2,132	2,558	3,410

**Table 4.5 Rural Income, Market Share, WTP, Current Energy Cost and Tariff Range**

Income Class <sup>1</sup> (US\$/month)	SHS Size (Wp)	Share of customers surveyed	Share of customers in income class	Willingness to Pay (WTP) (US\$/month)	Current Fuel Expenditure (US\$/ month)	Tariff Range (US\$/month)
< 150	50	28.5%	95%	10.5	12	
150 - 250	50	13.5%	30%	11	14	14.6
300 - 400	50	0.6%	4%	16.5	26	to
> 400	50	0.0%	0%	18	29	21.6
< 150	70	1.5%	5%	13	14	
150 - 250	70	29.3%	65%	12	16	20.1
300 - 400	70	0.9%	6%	16.5	26	to
> 400	70	0.2%	2%	18	29	27.1
150 - 250	100	2.3%	5%	23	22	22.8
300 - 400	100	12.0%	80%	20	22	to
> 400	100	0.6%	6%	28	32	30.0
300 - 400	150	0.8%	5%	22	22	27.8 to
> 400	150	5.7%	57%	28	32	39.6
300 - 400	200	0.5%	3%	33	29	35.4 to
> 400	200	1.5%	15%	38	36	47.6
300 - 400	250	0.3%	2%	33	29	39.6 to
> 400	250	1.2%	12%	38	36	52.3
> 400	300	0.5%	5%	38	36	47.2 to 60.3
> 400	400	0.3%	3%	38	36	55.8 to 69.1

Above totals  
100%

Income Class (\$/month):

Low: 150

Medium-low: 150-250

Medium-high: 300-400

High: 400

Source: SE Argentina, May 1998

#### Sensitivity Analysis Cases

6. The sensitivity analysis assumptions are shown in the following Table 4.6.

**Table 4.6 Sensitivity Analysis Assumptions**

Variable changed from base case:	
RES costs	-20%, -10% and +20% variation
Future market induced (Base = 10%)	0.0% and +20% level
Project market penetration	-10% and +10% Variation
Discount rate (Base = 10%)	12%; and 14%
WTP (Base = cost + 15%)	Actual fuel cost and +25%

Table 4.7 Results of the Sensitivity Analyses

7/5/98

Variable Change	Economic Index	1 Jujuy	2 Misiones	3 Corrientes	4 Rio Negro	5 Mendoza	6 San Luis	7 Formosa	8 Entre Rios	9 La Rioja	10 Santiago del Estero	All 10 Provinces in Project
<b>RES System Cost</b>												
-20.0%	IERR	23.3%	21.0%	24.0%	22.7%	23.1%	20.9%	21.1%	21.5%	21.1%	18.5%	21.2%
	NPV	\$1,057	\$6,769	\$8,336	\$1,292	\$786	\$1,205	\$4,140	\$4,622	\$842	\$6,675	\$35,723
-10.0%	IERR	17.6%	15.5%	18.8%	17.5%	18.2%	16.3%	16.5%	16.8%	16.5%	14.0%	16.3%
	NPV	\$655	\$3,665	\$5,653	\$832	\$532	\$745	\$2,577	\$2,942	\$529	\$3,369	\$21,498
10.0%	IERR	8.5%	6.6%	10.4%	9.3%	10.3%	8.7%	8.8%	9.1%	9.0%	6.5%	8.2%
	NPV	(\$147)	(\$2,543)	\$288	(\$87)	\$25	(\$174)	(\$549)	(\$418)	(\$96)	(\$3,241)	(\$6,942)
<b>Future Market Induced</b>												
0.0%	IERR	8.7%	9.8%	10.8%	12.5%	11.4%	8.3%	9.3%	9.8%	8.6%	6.4%	9.1%
	NPV	(\$96)	(\$168)	\$460	\$290	\$90	(\$198)	(\$275)	(\$90)	(\$108)	(\$2,899)	(\$2,993)
20.0%	IERR	15.7%	12.0%	17.3%	13.9%	16.3%	15.5%	15.0%	15.3%	15.7%	13.1%	14.5%
	NPV	\$604	\$1,474	\$5,481	\$481	\$466	\$767	\$2,302	\$2,614	\$540	\$3,027	\$17,756
<b>Project Market Penetration</b>												
-10.0%	IERR	12.4%	10.4%	13.9%	12.7%	13.6%	11.8%	11.9%	12.3%	12.1%	9.7%	11.6%
	NPV	\$201	\$243	\$2,430	\$293	\$228	\$212	\$756	\$968	\$165	(\$273)	\$5,224
10.0%	IERR	13.0%	11.1%	14.7%	13.5%	14.4%	12.6%	12.8%	13.1%	12.9%	10.4%	12.4%
	NPV	\$307	\$878	\$3,510	\$451	\$329	\$358	\$1,271	\$1,556	\$268	\$400	\$9,328
<b>Discount Rate</b>												
12.0%	IERR	12.7%	10.8%	14.3%	13.1%	14.0%	12.3%	12.4%	12.8%	12.5%	10.1%	12.0%
	NPV	\$60	(\$743)	\$1,378	\$116	\$119	\$28	\$138	\$294	\$37	(\$1,467)	(\$41)
14.0%	IERR	12.7%	10.8%	14.3%	13.1%	14.0%	12.3%	12.4%	12.8%	12.5%	10.1%	12.0%
	NPV	(89)	(1,712)	(165)	(28)	(1)	(163)	(503)	(417)	(96)	(2,570)	(5,462)
<b>Without GEF</b>												
None	IERR	10.5%	8.4%	11.8%	10.6%	11.4%	9.8%	9.9%	10.2%	10.0%	7.8%	9.6%
	NPV	\$53	(\$1,211)	\$1,323	\$78	\$111	(\$28)	(\$49)	\$118	\$3	(\$2,173)	(\$1,775)
<b>WTP = Expressed WTP</b>												
	IERR	2.4%	-1.5%	2.7%	6.4%	10.6%	6.8%	2.8%	1.9%	3.0%	6.0%	3.1%
	NPV	(\$653)	(\$7,626)	(\$4,750)	(\$421)	\$45	(\$394)	(\$2,947)	(\$3,546)	(\$584)	(\$3,453)	(\$24,327)
<b>WTP = Current Fuel Cost</b>												
+0%	IERR	8.4%	5.8%	9.9%	8.6%	9.3%	8.9%	8.2%	8.4%	9.1%	6.4%	7.7%
	NPV	(\$142)	(\$2,914)	(\$63)	(\$168)	(\$45)	(\$136)	(\$765)	(\$741)	(\$79)	(\$3,157)	(\$8,212)
+25.0%	IERR	15.5%	14.0%	17.2%	16.1%	17.1%	14.4%	15.1%	15.6%	14.7%	12.5%	14.8%
	NPV	\$518	\$2,877	\$4,992	\$733	\$494	\$566	\$2,199	\$2,597	\$413	\$2,211	\$17,601
<b>Base Case (With GEF)</b>												
	IERR	12.7%	10.8%	14.3%	13.1%	14.0%	12.3%	12.4%	12.8%	12.5%	10.1%	12.0%
	NPV	\$254	\$561	\$2,970	\$372	\$278	\$285	\$1,014	\$1,262	\$216	\$64	\$7,276

## Results of the Sensitivity Analysis

7 The sensitivity analysis indicates that the variables with the most impact on the EIRR of the project are RES cost (affecting the net benefit), discount rate (changing the opportunity cost of capital), and the WTP (affecting the benefits). Cost decreases of 10-20% for RES increase project EIRR by about 4 to 5% for each 10% decrease in system cost. EIRR decreases by 4% for an increase in cost of 10%. Also, by excluding induced demand for RES's after the end of the project, the EIRR decreases by about 3%. A 20% increase in induced demand (versus a 10% increase in the base case), increases EIRR by 2.5%. Improving or decreasing the market penetration of the project by 10% and -10%, respectively, has little impact. Changing the discount rate from 10% to 12% and then to 14% (changes only the NPV), causes respective decreases in NPV by US\$7.3 million and US\$12.7 million. These are significant changes, given that the base case NPV is only US\$7.29 million.

## Market Penetration of SHS's

8. The Table 4.5 above shows that for each size of SHS the households choosing systems have a variety of incomes, and corresponding estimated WTP and current actual expenditures for traditional energy. It shows the choice by income group of each size system, that is, as the percentage of each respective income group which choose each size system. By far the most likely systems to be chosen are those of 50 Wp, 70 Wp and 100 Wp. The table demonstrates that the majority of consumers of the 50 Wp system are likely to fall in the low and medium-low income groups, that 70 Wp systems are likely to be chosen largely by medium-low income households, and 100 Wp systems largely by medium-high income groups.

9. The above WTP information can help to answer one of the more important questions in determining appropriate tariffs for SHS's. That is, what price for SHS's would be both "fair", in the sense of not too high, thereby pricing lower-income consumers out of the market, yet still be high enough to pay a substantial portion of SHS cost. Viewed another way, the WTP information can help to determine at what point higher prices would likely reduce the penetration for the different sizes of solar systems, thereby harming the overall development and environmental objectives of the project.

## Comparison between RES and Conventional Fuels

10. RES are characterized by relatively higher capital cost than conventional energy technology such as diesel electric power, but the technologies differ in their ability to utilize renewable energy resources which are site-specific and are usually low in cost. SHS, for example, deliver much higher quality light than traditional non-electric fuels such as kerosene, candles and LPG, and are significantly more reliable, convenient and cleaner than kerosene lamps. In general, RES have insignificant environmental impacts (with the exception of small-hydro) and do not produce greenhouse gases, contrast to fossil fuels. In cases where diesel generation is clearly the least cost solution, as in a high household density situation that is best served by a mini-grid, the project will support its use instead of RES. While extending the utility grid is another option for providing rural electricity, this option is usually constrained by the combination of high cost for grid construction and very low power consumption by customers. Given the low population density and low power consumption in the areas covered by the project, grid extension is unlikely to be economically competitive with either isolated diesel for agglomerated rural populations nor SHS for more dispersed market areas under consideration by the project.

TABLE 4.8: ECONOMIC COST BENEFIT ANALYSIS (Figures in US\$ thousand)											
Year	Costs				Benefits					Net Benefit	
	Investment Costs	Replacement & O&M Costs	TA & Misc.	Total Costs	Household PV Systems	Collective newable System	Public Systems	GEF Grant	Total Benefits	Net Benefit Including GEF	Net Benefit xcluding GEF
1	\$0	\$0	\$1,088	\$1,088	\$0	\$0	\$0	\$500	\$500	(\$588)	(\$1,088)
2	\$3,591	\$0	\$5,124	\$8,715	\$471	\$68	\$317	\$2,100	\$2,955	(\$5,759)	(\$7,859)
3	\$17,208	\$199	\$5,957	\$23,364	\$3,124	\$449	\$1,500	\$2,100	\$7,173	(\$16,191)	(\$18,291)
4	\$31,246	\$1,735	\$6,426	\$39,406	\$9,506	\$1,384	\$2,349	\$2,700	\$15,939	(\$23,467)	(\$26,167)
5	\$38,908	\$5,795	\$7,461	\$52,164	\$18,863	\$2,762	\$2,462	\$3,200	\$27,307	(\$24,857)	(\$28,057)
6	\$30,747	\$10,718	\$5,794	\$47,260	\$26,145	\$3,864	\$2,575	\$2,300	\$34,884	(\$12,376)	(\$14,676)
7	\$7,200	\$15,202	\$1,000	\$23,402	\$27,971	\$4,142	\$2,688	\$300	\$35,101	\$11,698	\$11,398
8	\$25	\$17,483	\$0	\$17,508	\$26,535	\$4,226	\$2,801	\$0	\$35,562	\$18,054	\$18,054
9	\$0	\$17,331	\$0	\$17,331	\$29,099	\$4,311	\$2,914	\$0	\$36,324	\$18,992	\$18,992
10	\$0	\$18,237	\$0	\$18,237	\$29,663	\$4,395	\$3,027	\$0	\$37,085	\$18,848	\$18,848
11	\$0	\$18,793	\$0	\$18,793	\$30,227	\$4,480	\$3,140	\$0	\$37,847	\$19,054	\$19,054
12	\$0	\$17,920	\$0	\$17,920	\$30,791	\$4,564	\$3,253	\$0	\$38,608	\$20,688	\$20,688
13	\$0	\$19,819	\$0	\$19,819	\$31,355	\$4,648	\$3,366	\$0	\$39,369	\$19,551	\$19,551
14	\$0	\$26,168	\$0	\$26,168	\$31,919	\$4,733	\$3,479	\$0	\$40,131	\$13,963	\$13,963
15	\$0	(\$4,335)	\$0	(\$4,335)	\$32,483	\$4,817	\$3,592	\$0	\$40,892	\$45,227	\$45,227
PV at 10%	\$82,459	\$65,212	\$22,505	\$170,176	\$132,823	\$19,625	\$15,953	\$9,051	\$177,453	\$7,276	(\$1,775)
IERR										12.0%	9.6%

## **GEF Environmental Approach to Incremental Costs and Benefits**

### **Broad Development Goals and Baseline**

1. **Energy policy goals and rural electricity.** The goals and policies of the Government of Argentina (GOA) for the development of the energy sector are: to continue the expansion of private sector participation in the power business, to diversify the use of primary energy resources, to minimize negative impacts of energy use on the environment and the society, and to make energy services available to the population at large. To reach these goals, the GOA is making every effort to consolidate the power sector reform in the country by: (i) strengthening the power sector regulatory framework and institutions in the provinces; (ii) promoting more private investment in the sector; and (iii) making rural electrification and deployment of renewable energy systems a key and integral part of its rural development strategy.

### **The Baseline Situation**

2. **Private concession system.** The GOA's intended program for electrification of dispersed areas is one where private concessionaires are expected to:

- Continue the provision of electricity services to public service centers and agglomerated communities already electrified with diesel and other systems. The higher cost of doing so (compared to concentrated markets) will be offset with subsidies.

Provide new electricity supplies and services to designated public service centers and agglomerated communities that are not currently electrified. The public service centers will be subsidized. Subsidy to households in agglomerated communities will depend on income level.

- Provide basic electricity supply and services to dispersed individual households. The poorest segment of the market will be entitled to subsidies. The GOA considers this as equivalent to the provision of lifeline tariffs to low income households in the grid markets.
- In general, all other not electrified private consumers would be provided basic electricity supply and service at their cost.

3. In the absence of specific measures to remove barriers to renewable utilization, it is expected that the mix of supply technologies would be weighted toward grid extension, diesel minigrid and stand-alone diesels. Low load densities would render isolated areas uneconomic or financially unviable to serve with conventional options, leading to a continued dependence on low quality traditional energy forms.

4. **Market barriers to renewable.** The three main barriers are:

- a) insufficient information for prospective private investors to compete for investment in a concession system based on renewable energy. These include information on market size and characteristics, the costs of operation and maintenance of systems in dispersed and difficult terrain, adequacy of the proposed tariffs, potential difficulty in tariff collection, etc.

- b) need for substantial investment resources at the front end, due to the high capital cost/low recurring cost nature of renewable energy investments. These capital resources are at risk from the potential for consumer default or termination of service and these risks are partially mitigated through the consumer connection fee.
- c) market reception of a relatively new technology : will clients accept it? or, will clients be able and willing to pay for the system or service? In surveys, for example, many not electrified rural people expressed a preference for AC service or were not interested in SHS because it would reduce their chances of being selected for grid-connection in the future. The reasons on the consumer side include inadequate information on the benefits of the new technologies, and high initial costs of SHS.

#### Global Environmental Objective

- 5. **Barrier removal strategy.** Lack of information on market characteristics, real costs of operation and others will be addressed by carrying out a number of market profile and demand studies and detailed analysis of typical cash flows in a concession in each of the provinces, and disseminating it among private investors. GEF grant financing for these studies, as well as the training of provincial regulators in the regulation of renewable operations, will be sought. It is understood that only incremental costs, i.e. costs over and above those required for conventional fuel-based concession systems, could be requested.
- 6. The front-end barrier will be addressed by:(a) the IBRD loan and GOA counterpart funding; and (b) financing the incremental cost of the renewable energy systems with the GEF for a limited time until unit costs decline with increased market volume.
- 7. The risks related to consumer acceptance will be addressed by combination of: (a) promotion and demonstration programs to educate rural area dwellers on the benefits of the new technologies; and (b) judicious application of GEF grants and GOA subsidy funds to reduce the high first costs to consumers of the new technologies; and (c) judicious application of GOA subsidy to consumers to meeting the high recurrent maintenance costs of systems in dispersed areas, particularly in the early years when the consumer base is still small.
- 8. **Global Environmental Benefits.** The GEF alternative will lead to the abatement of about 1.5 million tons of CO<sub>2</sub>. The cost of the CO<sub>2</sub> abatement by applying the GEF grant would be less than \$8/ton<sup>1</sup>. These calculations by SEP will be refined during project appraisal.

#### Alternative Mechanisms for Delivering Solar Home Systems (SHS)

- 9. There are many instances worldwide of commercial or semi-commercial deployment of SHS involving relatively small numbers of installations. However, the Bank is currently supporting two large scale renewable energy projects: (i) in Indonesia, the largest project so far, aims at providing about 200,000 rural homes with SHS; and (ii) in Sri-Lanka, the project is targeted at about 32,000 rural homes. These two projects have chosen to serve the market through a delivery mechanism involving individual private dealers competing in open market systems. Notwithstanding, in the project supported by the Bank in Argentina, where unelectrified rural households are estimated to be nearly 350,000, the delivery mechanism contemplated is the

<sup>1</sup> Based on about 10 kg of CO<sub>2</sub> is abated for every kWh of PV electricity when substituting for kerosene lighting (See De Lucia 1994). Assume 4 hr. use every night.

concession approach, where private companies compete to obtain exclusive rights to serve a whole area (e.g., a whole province).

10. The concession is essentially an Energy System Company (ESCO) with exclusive rights to a market area. While concession operation in each province is monopolistic, competition will be fostered at the bidding stage. Furthermore, since different companies will be operating separate concessions in the different provinces, there will effectively be competition in performance.
11. There are several potential advantages to the concession approach:
  - a) provides a market of sufficient critical mass for business;
  - b) attracts larger, better organized private companies with own sources of financing or leads to the creation of such companies in the country;
  - c) permits easier administration and regulation (one large operator in the market instead of many small ones to monitor);
  - d) brings better chances of covering a large number of customers in a few years;
  - e) involves good potential for reducing unit costs of equipment (through volume discounts), transactions (selling, collection, etc.), operation and maintenance (one vehicle serving 200 customers instead of 20), and spreading the fixed administrative cost of the provider over a large number of customers; and
  - f) ensures service to the consumer over a long period, i.e. while the concession lasts (15 years in the Argentinean case)
12. The concession system is not the only effective approach to large-scale commercial deployment of renewable. The approach being implemented in Indonesia and Sri Lanka through competitive operations by individual SHS dealers has many advantages as well, given the particular situation in these two countries. As more international experience in these different delivery mechanisms is obtained in the coming years, it is anticipated that not one but several delivery mechanisms will be found effective depending on the particular country context.
13. From a cost recovery point of view, the dealer and the concession delivery mechanisms are equivalent. The dealer sells the equipment to a customer who pays a down payment and periodical installments to amortize the debt. In the concession case, the concessionaire provides a consumer with the equipment and the consumer pays an installation fee and a monthly tariff to recover the balance of the equipment cost plus the operation and maintenance costs incurred by the concessionaire in keeping the equipment operational. The installation fee may be seen as the down-payment while the monthly tariff can be considered as equivalent to the periodical amortization of the debt. For example, a 50W SHS with installed cost of about \$760, may require a \$76 installation fee and a monthly tariff of \$17 over 15 years. This tariff is equivalent to a down payment of 10 percent plus the amortization of the equipment at a rate of \$9 per month (15 years, 14 percent interest rate) plus a payment for operational and maintenance cost of \$8 per month.
14. In the above example, the concessionaire and the dealer are faced with the same risks of consumer acceptance. The consumer may not be buying equipment from the concessionaire but is making a decision on whether the initial payment of \$76 and the monthly payments of \$17 are acceptable to him. This decision will depend, among others factors, on the level of his monthly income and his present energy expenditures. Other factors would be the fact that in buying the equipment from a dealer, the consumer becomes the owner of the equipment and needs to enter into a special operational agreement with the dealer to ensure continuity of service. On the concession alternative, the concessionaire is the owner of the equipment and must provide the consumer with continuity of service during the concession period.

Consequently, the concession delivery mechanism provides the consumer with better protection against the provider.

### **The GEF Alternative**

15. **Main characteristics.** The project agreed upon with GOA is a situation where, to the extent feasible, environmentally benign renewable energy technologies such as solar home systems (SHS) and centralized wind or wind/diesel/PV hybrids are chosen instead of fossil fuel-based technologies to supply electricity to the household and public service centers within each dispersed area concession. The purpose is not merely to substitute renewable for carbon-emitting systems but to do so in manner that will contribute to the accelerated development of the market for renewable energy systems, both in Argentina and globally.
16. The success of the concession system in Argentina and its replication in other countries can accelerate bulk purchases of PV systems in the world market, effect more rapid deployment of SHS in rural areas, lead to a reduction in PV costs per peak watt globally and, of course, mitigate more quantities of GHG. GEF support of the Argentina project is therefore not simply for Argentina's benefit. A concession approach patterned after Argentina's is already being seriously considered by the Brazilian Government for a proposed World Bank project to provide SHS to dispersed areas in Bahia, Ceara and Minas Gerais.
17. **Sustainability.** At the end of the duration of the project (6 years over which the GEF would provide grants during the first 5 years of each concession contract), it is expected that cost reductions in operations and maintenance achieved through substantial expansion of the consumer base will obviate the need for the GEF grants. Through GIS data and information on O&M costs in the concessions for the provinces of Jujuy and Salta, the SE has calculated that reducing the number of kilometers per consumer serviced per month will reduce O&M costs per unit from \$4.96 to \$3.71 per month or a NPV of about \$56 per unit, as the number of customers increase from 100 to 350 for each maintenance team. Considering other possibilities for cost reductions (such as global drop in PV prices in the next 5 years), it is reasonable to expect that the GEF grant can be removed at the end of the project without a negative impact on program sustainability. Finally, it must be noted that the GEF grant level proposed is only about 10% of the system costs, well within the profit margin of the concessionaire and existing tax levels.

### **Scope of the Analysis**

18. The scope of the analysis is essentially national as it includes the national government, the participating provinces/government, bidders/concessionaires and the consumers.

### **Market and Costs**

19. **Baseline costs.** Based on GOA socioeconomic surveys of the dispersed areas in four provinces, the not electrified households belong to essentially four levels of energy expenditures:

Table 4a.1: Socio-Economic Structure of the Market			
Income Type	Income/month	Percent of Households	Approximate Energy Expenditures/month
I	<\$150	19	\$10.0
II.	\$150 to \$250	40	\$15.0
III.	\$250 to \$400	27	\$25.0
IV.	>\$400	14	\$38.0

\* Energy expenditures are for kerosene, candles, dry cells and battery charging. These values are leveled monthly expenses, including replacement costs.

20. Current energy expenditures by households are considered the best indicator of their capability and willingness to pay. It is believed that the consumers cannot afford monthly payments higher than their current energy expenditures, regardless of the technology and institutional arrangements used to supply them. In the particular case of Type-I income consumers, their monthly energy expenditures are roughly similar to the monthly lifeline tariff provided to urban markets.
21. Type I and II households use Petromax, wick lamps and some candles for lighting plus dry cells for powering simple radios. There is little or no car battery charging. Considering normal life of these appliances, typical costs in the rural areas and surveyed hours of usage, the net present value of their energy expenditures by Type II households during 15 years is estimated at \$1,245. It includes equipment replacements over time.
22. A Type III household, on the other hand, uses Petromax or LPG lantern, as well as wick lamps for lighting. For powering radios and black and white TV sets, the household uses a car battery charged at a central station about twice a month, as well as some dry cells. The net present value of their energy expenses during 15 years is estimated at \$2,070.
23. For the Technical Assistance component, the baseline costs have been taken as the higher of: (a) estimated costs for the same elements within a standard private sector concession program without the renewable energy emphasis, or (b) already programmed GOA administrative budget support.
24. **GEF alternative cost.** GOA wants the concessionaire to provide SHS services in the levels of 50Wp, 70Wp, 100Wp, 150Wp and up to 400Wp. The Table below shows some estimates of economic costs for 50Wp, 70 Wp and 100Wp SHSs eligible for GEF assistance. The costs are broken down in installation cost, net present value costs of O&M and replacement of batteries and controllers, and the leveled monthly payment required to recover full costs.

Table 4a.2: SHS Economic Cost Recovery					
SHS size	Installation (\$)	O&M (\$)	Replacement (\$)	Total (\$)	Payment (\$/month)
50Wp	764	390	216	1,370	16.8
70Wp	1,074	390	299	1,763	23.1
100Wp	1,347	390	418	2,155	26.7

Note: Assumptions made: A market of 20,000 households; 14 percent discount rate; 15 years term; the 70Wp SHS is included to account for the findings of more detailed market surveys in 5 provinces completed at time of project appraisal.

### Incremental Costs

25. The different dispersed area market segments will have different incremental costs:
  - a) Public service centers. Since GOA is the customer, electrification of this segment is by edict, not by consumer choice. Even if PV or other renewable system were chosen, this market

segment does not qualify as a direct market development activity. Nevertheless, the additional requirement for PV hardware in such centers contributes to the size of the PV business and therefore its attractiveness to the private sector. No GEF financing is contemplated for this market segment.

- b) Agglomerated markets, regardless of households income level. Where existing or new diesel generators are the least cost supply option, *no GEF nor Bank financing is contemplated.*
  - c) Dispersed lowest income households (Type-I income level). These are households with less than \$150 per month income and fuel expenditures (kerosene, candles, dry cells) of less than \$7 per month. GOA wants this segment of the population to be provided with electricity for basic lighting, radio, etc. The system to be provided is 50Wp. GOA is prepared to subsidize this segment to the extent similar households in the grid-connected markets are being provided with lifeline tariffs. *No GEF assistance is contemplated for these consumers.*
  - d) Dispersed low income households (Type-II and Type-III income level). It is estimated that households in this market segment may be able to afford 50Wp, 70Wp, and 100Wp SHS, provided the connection fee is low and the tariff required for cost recovery is spread over the concession period (15 years). The GOA expects the concessionaire to exert full efforts to "sign up" this market. The GOA is willing to subsidize these consumers to the same extent as the lowest income group. The baseline for this market segment is the existing situation where the households obtain energy for basic lighting and entertainment by the use of kerosene, dry cells and battery charging. Because the life-cycle cost of the energy expenditures of these households is at present lower than the cost of using 50 to 100Wp renewable energy systems, *GEF assistance will finance the incremental cost of the SHS hardware and the promotional and market definition activities*
  - e) Other dispersed households (Type-IV income level). Preliminary analysis indicate that this group households already doing heavy battery charging—will even reduce their life-cycle costs by switching to individual SHS (negative incremental costs). This is a present-day "win-win" situation that nevertheless needs intervention to break market barriers at the consumer level. *GEF assistance will finance only the promotional and market definition activities associated to this market segment.*
26. **Incremental Cost of the Investment Component** Type I households (lowest income level at less than \$150 per month) subsidized in full by GOA are not considered for GEF assistance. Type IV households are also not considered because their incremental costs are estimated to be negligible or negative. Type II and III households earning less than \$450 per month, have energy use patterns considered suitable for the range 50 to 100Wp SHS. Thus, the incremental costs estimated by the SE with assistance of the Bank match this range of income with SHS of 50Wp, 70Wp, and 100Wp. The GEF grant will decline to zero at the end of initial 5 years of the concession contract, as shown in Table below.

Table 4a.3: GEF Grant (US\$ per installed SHS)						
SHS size	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
50Wp	125	125	120	105	70	0
70Wp	105	105	100	90	60	0
100Wp	85	85	80	70	45	0

27. GEF grant assistance to the 50Wp, 70Wp and 100Wp systems will effectively bring the SHS costs to roughly the level of current energy expenditures of the target consumer segments and

stimulate the creation of an initial consumer base. It is expected that the households will choose SHS sizes in rough relation to their income levels and energy needs.

28. During the five-year project implementation, the GEF grant and any GOA grant or provincial subsidy for the consumer will be collected by the concessionaire on behalf of the consumer upon proof of having installed the SHSs. The GEF grant will be available only for installations made during the initial 5-year period of the concession contract, providing additional incentive for the concessionaire to complete as many installations as possible within 5 years.
29. The main SHS market share comprising consumers Types II and III financed by the GEF is as follows:

Table 4a.4: GEF Grant for Hardware			
SHS Size	Estimated Market of the Project	Average GEF Grant US\$ per SHS	Total GEF Grant* US\$million
50WP	58,400	110.3	6.44
70WP	14,600	93.2	1.36
100WP	11,800	73.7	0.87
<b>Total</b>	<b>84,800</b>	<b>102.2</b>	<b>8.67</b>

(\*) Above values were revised at project appraisal to include the market for 70Wp SHSs.

30. **Incremental Cost of the Technical Assistance Component.** Several studies and activities will be carried out within the project to reduce information barriers at the concession and consumer levels, enhance the capability of provincial regulators to monitor the performance of concessionaires in the new technology areas, put in place standards and certification procedures for renewable energy equipment and installations, and to fine tune all aspects of project implementation. These activities have the ultimate objective of reducing or removing barriers to the sustainable marketing by the private sector of renewable energy technologies for rural electrification. The incremental cost of this component is estimated to be about US\$4.15 million, as detailed in the following Table:

**Table 4a.5: GEF Grant for Technical Assistance**

Activities	Total	Baseline	GEF
<b>Capacity Building on Renewable Energy</b>	<b>3.40</b>	<b>1.05</b>	<b>2.35</b>
Detailed market studies	0.60	0.10	0.50
Standards and Certification for SHS	0.30	0.10	0.20
Promotion and Public Education Campaign	0.75	0.25	0.50
Feasibility Studies for Centralized Renewable	0.40	0.10	0.30
Database to Improving Solar Resource Information	0.20	0.05	0.15
Database to Improve Wind Resource Information	0.25	0.05	0.20
Study to Match Direct Current Appliances to SHS	0.20	0.00	0.20
Workshops for Concessionaires and Suppliers	0.70	0.40	0.30
<b>Training</b>	<b>1.00</b>	<b>0.60</b>	<b>0.40</b>
<b>Project Administration</b>	<b>7.0</b>	<b>5.60</b>	<b>1.40</b>
Project Coordination Unit Staff	3.00	2.00	1.00
Consultant Roster	0.55	0.45	0.10
Provincial Implementing Unit Staff	3.30	3.00	0.30
Procurement Agency	0.15	0.15	
<b>Total (US\$ million)</b>	<b>11.40</b>	<b>7.25</b>	<b>4.15</b>

31. **Incremental Cost/Benefit Summary.** The matrix below summarizes the incremental cost of the GEF alternative (SHS in the range 50 to 100Wp) over the baseline alternative, and the global environmental benefits derived from the total project.

**Table 4a.6: GEF Incremental Costs and Benefits  
Incremental Costs and Benefits Matrix**

	Costs	Domestic Benefits	Global Environmental Benefits
<b>Baseline</b>	\$1,245/50W household \$1,660/70W household \$2,070/100W household	Lighting and other appliances <i>with</i> smoke and fumes	1.5 million ton of CO <sub>2</sub> emissions
<b>Alternative</b>	\$1,370/50W SHS \$1,763/70W SHS \$2,155/100W SHS	Lighting and other appliances <i>without</i> smoke and fumes	0 million tons CO <sub>2</sub> emissions
<b>Increment</b>	\$125/50W SHS \$105/70W SHS \$85/100W SHS 8.7 million for about 85,000 households	Elimination of smoke and fumes in households and public services of rural areas	Abatement of 1.5 million ton of CO <sub>2</sub>

#### Process of Agreement on the Incremental Cost Parameters

32. The incremental cost parameters described herein were derived by SE with assistance of the BanI on the basis of market studies and economic models developed in the course of project preparation and appraisal. The calculations will be confirmed during loan negotiations.

### Financial Summary

#### A. Project Financing

**Table 5.1: Summary Project Cost and Financing (Current US\$ million)**

	Implementation period (year ending December)							Total
	1998	1999	2000	2001	2002	2003	2004	
<b>Project Costs</b>	<b>1.7</b>	<b>10.0</b>	<b>27.2</b>	<b>43.7</b>	<b>54.2</b>	<b>41.9</b>	<b>8.5</b>	<b>187.2</b>
Investments Costs		4.8	23.2	41.9	53.1	41.0	8.5	172.5
Pilot WHS sub-project		0.4	0.2					0.6
Capacity Building	0.5	2.7	2.3	0.8	0.2	0.1		6.6
Project administration	0.7	2.1	1.5	1.0	0.9	0.8		7.0
Front end fee	0.5							0.5
<b>Financing Sources</b>	<b>1.7</b>	<b>10.0</b>	<b>27.2</b>	<b>43.7</b>	<b>54.2</b>	<b>41.9</b>	<b>8.5</b>	<b>187.2</b>
IBRD	1.2	3.4	7.2	10.5	12.5	9.7	2.0	46.5
GEF	0.5	2.3	2.4	2.8	3.3	2.3	0.4	14.0
Customers		0.5	2.3	4.2	5.3	4.1	0.8	17.2
FEDEI		1.0	5.1	9.0	11.4	9.0	1.9	37.4
GOA's Own resources		0.5	0.5	0.2				1.2
Provincial Governments		0.5	0.5	0.5	0.5	0.4		2.4
Concessionaires		1.8	9.2	16.5	21.2	16.4	3.4	68.5

**Table 5.2: Project Financing by Source of Funds<sup>1 2</sup>**

	WB	GEF	GOA	Conc.	Cust.	PG	Total
<b>Equipment to be installed by Concessionaires</b>							
• SHS ranged from 50Wp to 100 Wp	16.7	8.7	12.4	29.8	7.4		75.0
• SHS ranged from 150Wp to 400 Wp	12.5		10.7	18.4	4.6		46.2
• equipment for small communities			2.1	1.6	0.4		4.1
• equipment for public service institutions	3.7		4.5	5.4			13.6
Two (2) Pilot WHS		0.4	0.1		0.1		0.6
Capacity Building							
• TA on renewable Energy	1.0	2.4					3.4
• TA for the national power sector	1.1		1.1				2.2
• Training	0.5	0.4	0.1				1.0
Project Administration	3.0	1.4				2.4	6.8
Front end fee	0.5						0.5
Contingencies(physical and prices)	7.5	0.7	7.6	13.3	4.7		33.8
<b>Total</b>	<b>46.5</b>	<b>14.0</b>	<b>38.6</b>	<b>68.5</b>	<b>17.2</b>	<b>2.4</b>	<b>187.2</b>

Note 1: WB= World Bank loan; GEF= Global Environmental Fund; GOA=FEDEI and GOA's own resources); Conc.= Concessionaire's equity; Cust= customer's installation fees; PG= provincial government counterpart

Note 2: please note that physical and price contingencies are included separately

## **B. GEF Cofinancing**

1. The GEF Grant will be available to finance SHS, technical assistance and training. The grant will finance SHS of 50 Wp, 70 Wp, and 100 Wp to be installed by concessionaires in the participant provinces. The grant will be used to finance the initial cost of equipment installed, and it will be released after installation of the equipment. The grant will be disbursed in a decreasing trend as described in Annex 6 (Procurement and Disbursement Arrangements), during the five years following the signature of the concession contract. The GEF grant will also be available to finance part of the capacity building component as described in Annex 6.

## **B. Business Valuation**

2. The provincial rural market was grouped in five markets having a number of customers close to the number of potential customers of the provinces to be served by concessionaires. A business evaluation was carried out for each of these potential markets by simulating the financial operation of the concessions during 15 years.

### **B.1 Main assumptions**

3. The financial projections were prepared using the following assumptions:

**3.1 Concession.** The provision of electricity service to dispersed population in rural Argentina will be done through Concession Contracts of geographical areas specifically indicated in the provinces participating in the project. The concession contracts will be awarded through international competitive bidding (ICB) following the Bank's procurement guidelines (Annex 6). The special principles described below will be reflected in detail in the concession contracts. Other principles which are common commercial practices in concession contracts are not described.

- a) *Duration and Renewal of the Concession.* The concession will have a duration of 45 years comprising three operational periods of 15 years. No later than one year before the end of each operational period, an international competitive call for bids for contracting the next operational period will be made by the PG. The existing concessionaire can bid again.
- b) *Boundaries and Exclusive Rights of the Concession.* The concession contract will clearly specify the geographical boundaries of the rural area to be served. The concessionaire will have sole or exclusive right for the concession area comprising individual rural consumers and public services (schools, police stations, health centers, public lighting).
- c) *Concessionaire Obligation to Serve.* Upon requests from dispersed rural consumers, the concessionaire will be obligated to promptly connect and provide them with electricity service based on either renewable energy system or conventional methods during the 15-year operational period of the concession. The concessionaire, at its own risk, will decide the method and technology of the supply system. The method of supply could be either individual supply or collective supply. The concessionaire will make all necessary investment required to provide the service. The concessionaire will recover investment and operational costs through pre-established tariff schedules to be paid by the consumers and, in some cases, subsidies to be paid by the provincial government.

- d) ***Nature of the Demand for Electricity Service.*** The electricity demand from rural consumers will fall into one of the following categories: (i) residential demand, individual and collective without metering, in the range of 125 to 1,000 Wh per day; (ii) collective daily demand during 5 hours, with energy metering, up to 60 kWh per month.
- e) ***Obligation to Comply with Service Standards.*** The concessionaire will be obligated to comply with the safety, environmental and quality of service standards for the installation and operation of the supply systems as enforced by the Provincial Regulatory Agency. The concessionaire shall carry out all necessary maintenance, repairs or replacement of equipment and components as needed to ensure the continuity of the electricity service to each and every consumer. The concessionaire should provide rural customers with state-of-the-art commercial services standards for connection requests, billing, collection and claim handling.
- f) ***Obligation to Inform the Provincial Regulatory Agency.*** The concessionaire will be obligated to provide the provincial regulatory agency with periodical reports (periods to be agreed) on the status of the concession service including but not limited to performance indicators such as number of connections by type of consumer and method and technology of supply, outages statistics, and financial results.
- g) ***Consumer Obligation to Pay for the Service.*** The consumers will be obligated to pay in full and timely for the electricity service. The consumers will pay in advance an installation fee (down payment) and a monthly charge specified in pre-established tariff schedules included in the concession contract. Some consumers served with renewable energy systems will be entitled to subsidies which will be reflected in the corresponding tariff applied to them.
- h) ***Cost Recovery Principle.*** The concessionaire will recover the cost of service through tariff schedules pre-established by the corresponding provincial PRA, and through subsidies to help consumers pay for part of the initial investment and operational costs, in some specific cases. These cases will be defined in the call for bids and the concessionaire should have to accept them as a condition for bid validity. In accordance with the principle that the concession will be awarded to the bidder offering the largest contribution to the initial investment, over 40% specified in the bidding documents, the values included in the tariff schedules should be the discounted values. The tariff design should ensure recovery of the costs incurred by the concessionaire only. The tariff schedules will be reviewed by the PRA every 5 years and it will determine whether there are merits to enforce a revised schedule. The tariffs should have the following structure: (i) an installation fee to be paid in advance by the consumer, estimated at 10% of the total initial investment plus installation cost; (ii) a monthly charge to be paid by the consumer; (iii) a fixed amount subsidy to help a segment of the rural consumers pay for part of the higher initial investment of the electric supply system based on renewable energy. The subsidy will be paid by the provincial government. Only the tariff applicable to SHS of 50Wp, 70Wp, and 100 Wp installed during the first 5 years of the concession will have compensation from the GEF grant. The amount of the subsidy will be explicit in the tariff schedule; and (iv) a monthly subsidy to help a segment of the rural consumers pay for the monthly charge not fully covered by their payment capability. This subsidy will be applied to SHS only and paid for by the provincial government. The amount of the subsidy will be explicit in the tariff schedule.
- i) ***Collection and Payment of Consumer's Subsidies.*** The concessionaire will collect the subsidies to rural consumers from the provincial government. This procedure is intended to meet two objectives: (i) to simplify the transfer of rural subsidies, in turn, from the provincial government to rural consumers and then the payment by the latter to the concessionaire; and (ii) to ensure that the subsidy is used to pay for higher cost of renewable energy systems and

limited payment capability of only low income rural consumers. To collect the subsidies the concessionaire should present to the provincial government at least the following evidence: (1) the consumer has paid the installation fee; (2) the equipment and its installation comply with the safety, technical and environmental standards enforced by the provincial regulatory agency; and (3) compliance with other conditions required by the FEDEI, FCT, GEF which should be specified in the concession contract.

**3.2 Number of customers.** The number of customers of the provincial market was estimated based on data from preliminary market studies carried out by the SE with assistance of consultants. Final number of customers will be determined at the implementation stage. The provinces were grouped in five representatives markets (Table 5.3.)

<i>Market</i>	<i>Number of customers</i>	<i>Province</i>	<i>Total number of customers</i>
1	25000	Santiago del Estero (*)	25,004
		Misiones	23,887
2	20000	Corrientes (*)	19,500
3	15000	Formosa	13,395
		Entre Rios (*)	14,708
4	3000	San Luis (*)	3,161
5	2000	Rio Negro	2,574
		Mendoza (*)	2,176
		La Rioja	2,206
		Jujuy	2,320

\* Provinces marked with (\*) were used as representative markets.

**3.3 Tariff.** The tariff will be determined for each province based on the following principles:

- a) **Cost recovery.** The tariffs should recover all costs excluding grants aimed at breaking market barriers and cross subsidies to rural consumers for connection, operation and maintenance costs, which are needed to account for the socioeconomic conditions in rural Argentina. Customers will pay the installation fees and a monthly tariff to recover the investment, O&M costs and profit of the concessionaires.
- b) **Full tariff schedules.** Taken into consideration that the electric service provided by a SHS is given by its electricity storage capacity, regardless of whether the consumer utilizes it or not, the tariff cannot be based on the number of kWh consumed but on the recovery of the initial investment cost and the recurring operation and maintenance cost. Consequently, the *full tariff* for each size of SHS will be based on the total present worth value of the investment, operation and maintenance costs (including replacement of equipment) expected to be incurred to provide the electricity service over a concession period of 15 years. The GOA has the perception (and the Bank finds it reasonable) that the private sector's expectations from this project will be well represented if an annual discount rate of 14 percent is used in estimating the tariffs. It is worth noting that the size and location of the market (number of customers) has an important economy of scale effect on the operation and maintenance cost, and therefore the tariff for a given size of SHS will differ among provinces.
- c) **Consumer tariff schedules.** Once the maximum total contribution of the concessionaire and the GEF grant are known, the tariff will be designed taking into consideration the specific features of the rural markets, mainly the payment capacity of the rural consumer. The total present worth of the electricity service can be visualized as comprising four parts: (i) the GEF

grant (if applicable) on the initial investment; (ii) the PG grant on the initial investment (if applicable); (iii) the total concessionaire contribution; and (iv) the consumer initial installation fee (down payment). Because the concessionaire is entitled to recover only its contribution, the *consumer tariff schedule* must comprise three components: (1) an installation fee (down payment) of about 10 percent; (2) a monthly charge equal to the consumer's payment capability or willingness to pay; and (3) a monthly subsidy component (if any) which present worth value is equal to the difference between the total concessionaire contribution and the present worth value of the monthly consumer payments. All present worth values will be calculated at an annual discount rate of 14 percent.

### 3.4 Criteria for applying subsidies.

- a) Consumers with a SHS installed capacity equivalent up to 400 Wp will be subsidized, and the tariff will be regulated.
- b) Consumers connected to SHS of more than 400 Wp will not be entitled to any type of grant or subsidy because their income would allow them to afford full cost recovery of the electricity service. The tariff for these customers will not be regulated. These customers may be supplied by a provincial concessionaire of the rural market at a tariff to be negotiated.
- c) Low income consumers connected to SHS in the range 50 - 100 Wp will be eligible to the GEF grant, but should pay a monthly tariff commensurate with their payment capability.
- d) Dispersed rural public services connected to SHS will not be eligible for the GEF grant but will be entitled to subsidies from the PG.

**3.5 Taxes.** The concessionaires will pay custom duties of 18 percent on the CIF value of imported equipment, and 30 percent income tax. It is assumed that an initiative taken by the SE will approve legislation to exempt the application of the Value Added Tax (VAT) on SHS imported by concessionaires for installation in rural areas.

**3.6 Debt financing.** It is assumed that commercial loans are available to the concessionaires at an average annual interest rate of 11 percent and 8 year term. The loans are assumed to fill the financing gap left when revenues less operating expenses plus taxes are not enough to finance the investment program.

## C.2 Base Cases

4. Based on the financial projections, the net present value (NPV) of the net cash flow (before dividend payoff) of the five representative markets (as defined in apar 3.2 above) was calculated for 10 to 18 percent annual discount rates during 15 years of business. Table 5.4 below summarizes the results for the five market sizes.

Table 5.4: NPV of net cash flow of concessionaire (US\$ thousand)					
Market Size	Annual Discount Rate				
	10%	12%	14%	16%	18%
25,000 customers	10,471	8,752	7,352	6,205	5,260
20,000 customers	7,479	6,257	5,260	4,444	3,771
15,000 customers	6,228	5,215	4,389	3,712	3,154
3,000 customers	1,1435	1,197	1,003	844	714
2,000 customers	814	678	569	479	404

5. The above results show clearly how, on one hand, the NPV of the net cash flow increases with the size of the market, and on the other hand, the NPV decreases as the opportunity cost of money for the concessionaire increases. In all the cases, the concessions appear to be a reasonably good business for the concessionaires. Obviously, the large markets would be more attractive to the private sector than the small ones.

### C.3 Sensitivity Analyses

6. Sensitivity analyses of the NPV were carried out for the five representative markets in order to test their financial viability for changes in key parameters. The sensitivity analysis focused on the effect of changes in four key parameters, i.e. number of customers in the market, equipment cost, operating and maintenance costs, and tariff. A change in the number of potential customers may occur due to a more or less effectiveness of the promotion or dissemination program, or due to tariffs higher than expected by the customers. Investment cost increase could happen if the relation US dollar to Argentine Peso increased due to macro economic instability. Investment cost could decrease due to massive production of SHS. Operating and maintenance costs increase would reflect the impact of escalation in local cost components (e.g. labor), as well as cost increase due to distance and difficult access to the location of customers. Operating and maintenance costs decrease would reflect high efficiency of the concessionaires.

7. *Sensitivity cases.* In the sensitivity analyses the value of key parameters were changed by +10 percent and by - 10 percent. In all the sensitivity cases, the reference discount rate of 14 percent was used in the calculation of the NPV. Table 5.5 below summarizes the results.

8. *Extreme cases.* Worst scenarios were simulated for the 25,000 and 2,000 customer markets by decreasing at the same time the market size and the tariff by 10 percent, increasing at the same time the investment and O&M cost by 10 percent, and using a 18 percent discount rate.

In the 25,000 customer case the NPV drops to about US\$ 3.57 million as compared to US\$7.35 million of the Base Case. In the 2,000 customer case the NPV is still positive at a low value of US\$0.08 million, as compared to US\$0.57 of the Base Case.

**Table 5.5 : Sensitivity of NPV to market size**  
**Figures in US\$ thousand**

Market Size	Base Case	Market size		Investment cost		O&M cost		Tariff	
		+10%	-10%	+10%	-10%	+10%	-10%	+10%	-10%
Customers									
25,000	7,352	8,169	6,536	6,665	8,183	6,952	7,751	9,697	5,156
20,000	5,260	5,870	4,657	4,768	5,752	4,914	5,607	6,890	3,631
15,000	4,369	4,890	3,890	4,047	4,784	4,104	4,673	5,705	3,136
3,000	1,003	1,146	833	878	1,107	861	1,120	1,377	612
2,000	569	672	488	520	632	479	658	808	348

9. As expected, the NPV decreases for increases in either the investment cost or the O&M costs, and decreases for increases in either the market size or the tariffs. It is significantly sensitive to changes in the tariffs. An increase of the tariff by 10 percent increases the NPV by about 32 percent in the 25,000 customer market and by about 42 percent in the 2,000 customer market.

## C.4 Conclusion

10. Based on above financial analyses, it is expected that the project will attract private sector participation as concessionaires to serve the provincial rural market with renewable energy systems.

### Subsidies in Electricity Pricing

4. Subsidies are an important consideration in rural electrification due to the high unit cost of service combined with low average usage, resulting traditionally in substantial capital and operating subsidies. In the case of RES's the intention is to extend the reach of electricity services by obtaining freedom from the requirement for connection to the grid network, and by tailoring the size of systems to consumer capacity to pay and basic energy requirements. Nonetheless, RES although considerably more cost-effective in dispersed rural settings than conventional electricity supply, require subsidies for various reasons

**FEDEI Subsidies:** The GEF will be providing a subsidy as part of this project in order to reflect the relative global environmental benefits of RES versus conventional energy sources. Additional subsidies are being provided to rural consumers through the FEDEI fund for electrification in rural and low-income areas. FEDEI subsidies are not explicitly directed toward mitigation of environmental, as opposed to income distributional ones. These are a recognition of social value of electricity which the consumer due to unequal income distribution is unable to afford. No attempt was made to introduce such subsidies as benefit measures in this analysis, instead, the current cost of energy supply as a measure of benefit was increased by 15 percent to account for some consumer surplus.

**Lifeline Rates.** Another recognized subsidy currently in effect in Argentina is the application of so-called "lifeline" rates. Lifeline rates recognize that society desires that all consumers obtain a certain minimum of electricity services, and provides a low basic tariff (price) for this minimum amount. World Bank policy generally accepts the principle that rural electrification subsidies not greater than urban subsidies are acceptable from a policy perspective. In Argentina, a brief review of lifeline tariff amounts was made with the assistance of the SE. In three provinces, respectively, Santiago del Estero, Formosa and Mendoza, it was reported by SE that subsidies amounted to approximately US\$4, S\$8 and US\$5 for the lowest electricity tariffs. These amounts are quite similar to, and consistent with the proposed tariff subsidies (US\$6.10-US\$6.40) for the lowest size SHS category (50 Wp) which is expected to be installed in the lowest income households.

**Pricing Principles and Subsidies for Rural Electrification.** Almost all rural electric (RE) systems require some type of supplemental financial support to cover their costs due to their relative high cost per consumer, low consumer density, low average consumption and poor load factor. In practice, subsidies are applied to either the investment costs or to the operation and maintenance of the delivery system. The Bank supports the principle that where subsidies are given to the low income rural consumer, the subsidy should be on the investment until the delivery point and that the consumer should pay a tariff to cover at least the O&M costs of the system plus the energy cost. Regarding the source of financing for the subsidy, a cross subsidy is preferred by the Bank to a fiscal subsidy. Regardless of subsidies, sound design of rural power systems requires adhering to appropriate standards of design, reliability and quality for individual RES and decentralized power supply, with due consideration to optimizing the cost of supply vis-a-vis the demand size and load factor.



### Procurement and Disbursement Arrangements

#### **Procurement methods (Table A)**

1. Procurement of goods and services will be done in accordance with Bank procurement guidelines, unless otherwise is approved by the Bank. Three procurements methods are envisaged: (a) procurement for the selection of new concessionaires for the provision of electricity service to dispersed rural markets using renewable energy and other systems; (b) procurement of goods and services by existing concessionaires in the provinces; and (c) procurement of goods and services by the National Government or the Provincial Governments

#### **Procurement method for the selection of new concessionaires.**

2. The new concessionaires will be selected through international competitive bidding (ICB) in the eligible provinces where either the dispersed rural market has not been given in concession or the existing concessionaire has relinquished its right to serve the dispersed rural market by signing an agreement with the Provincial Government (PG).

3. The ICB will be done using model bidding documents. The model bidding documents will include a special method for bid evaluation, and a model concession contract, both to be agreed before loan effectiveness. These models will be based on drafts already reviewed by the Bank but not yet confirmed by the SE. The main principles governing the design of the model concession contract for renewable energy systems in rural markets are described in Annex 5, Financial Summary.

4. The special method for bid evaluation is intended to identify the bidder who, by offering to finance more than 40 percent of the costs of the Solar Home Systems (SHSs), will minimize the subsidy to the consumers, and consequently, the cost to the GOA. This approach is a logical consequence of the fact that each concessionaire will recover the cost of service through tariff schedules pre-established by the corresponding PRA, which include subsidies to help rural consumers pay for part of the initial investment and operational costs, in some specific cases. The tariff schedules will be included in the bidding documents and the concessionaire must accept them as a condition for bid validity. In each province, the concession contract will be awarded to the technically and financially qualified bidder offering the greatest financing. In these cases, the selected concessionaires will procure the SHSs and their installation following its own procurement rules.

5. Equipment and installation costing about US\$ 78.2 million (including contingencies) will be procured following this method, of which the Bank will finance US\$17.8 million and the GEF US\$4.2 million equivalent (*Tables C1 and C2*). No less than US\$31.0 million would be financed by the concessionaires, and the balance by the consumers and the FEDEI.

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Procurement of goods and installation services by existing concessionaires

6. Procurement of goods and services by existing eligible provincial concessionaires intended to be financed by the Bank loan and the GEF grant will be done in compliance with the Bank procurement guidelines. For this purpose, the concessionaires will use standard bidding documents either for ICB or NCB, depending on the amount of the contracts (paras. 9 below). These standard documents will be agreed before loan effectiveness. Equipment and installation costing about US\$93.8 million (including contingencies) will be procured by the concessionaires, of which the Bank will finance US\$22.2 million and the GEF US\$5.3 million equivalent (*Tables C1 and C2*). No less than US\$37.5 million would be financed by the concessionaires, and the balance by the consumers and the FEDEI.

Procurement of goods and services by the National Government or the Provincial Governments.

7. Procurement of goods and services by the National Government or the Provincial Governments will be done in compliance with the Bank procurement guidelines. The procurement will include two turnkey contracts for two wind household system (WHS) pilot sub-projects, consultant services, and office technology equipment and software for the PCU, and coordinators for the PIUs, costing about US\$14.6 million including contingencies, of which the Bank will finance US\$6.0 million and the GEF US\$4.6 million equivalent, and the balance by the GOA and the PGs.

Consultants Services (Table D)

8. Eight consultant firms will be selected based on quality and cost (QCBS) of services offered. A total of US\$3.1 million equivalent will be contracted under that modality. Four consultant firms will be selected based only on quality (QBS) of services offered. A total of US\$0.75 million equivalent will be contracted under said modality because the studies to be carried out either involve delicate policy decisions (policy on use of renewable energy in urban and rural areas) or are of a very complex specialized nature (catalog of hydroelectric projects for private participation; environmental status of the power sector; matching of DC appliances to SHS). A number of individual consultants will be hired to assist the PCU and the provincial PIUs in several specialized areas (power sector regulation; public education campaigns; workshops; legal aspects of concession contracts; environment; tariff design; project coordination; technical aspects of RES). A total of US\$5.0 million equivalent will be for individual consultant contracts based on the consultant qualifications selection method only (CQ/I). While, most of those individual consultant services will be short term contracts, three consultants posts in the PCU costing a total of about US\$0.35 million equivalent would be long term contracts (about 2 year each) for individual consultants hired under the single source selection method (SSS) because it is necessary to retain institutional memory and provide staff continuity in three key areas of the PCU (project coordination, provincial market studies, and concession and tariffs for RES). Additionally, the GOA intends to contract procurement services from the UNDP costing about US\$150,000 and finance it fully using its own resources (reserved procurement).

Prior review thresholds (Table B)

9. Goods and their installation costing over US\$350,000 will be procured through ICB. Goods and their installation costing between US\$350,000 and US\$100,000 will be procured through NCB. Smaller packages costing less than US\$100,000 would be procured through

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prudent shopping (minimum 3 quotations) up to an aggregated amount not to exceed US\$800,000 equivalent. Evaluation of domestic offers presented in response to ICBs will have a margin of preference of 15 percent when compared to the CIF value of foreign offers.

10. The Bank will review all contract with suppliers of goods and installation costing US\$100,000 equivalent or more. For those contracts costing between US\$100,000 and US\$200,000 equivalent the Borrower will only seek no-objection of the Bank by submitting the bid evaluation report before awarding the contract.

11. The Bank will review all contracts with consultant firms costing US\$100,000 and with individuals costing US\$50,000 or more. For contracts with firms costing between US\$100,000 and US\$200,000 the Bank will be informed of the results of the technical evaluation (without sending the evaluation report) only before proceeding to open the financial proposals. In the case of individual consultants, the Bank will review the short lists, the CVs and the TORs, prior to the issuance of the request for services letter.

**Disbursement of the Bank Loan (Table C1) and GEF Grant (Table C2)**

**Allocation of Bank Loan and GEF Grant proceeds**

12. Tables C1 and C2 show the allocation of funds from the Bank Loan and the GEF Grant, respectively, to Categories of disbursement for the different project components.

13. Disbursement of Category 1 (Solar Home Systems, SHS, for houses and public services) will be done in compliance with terms and conditions for disbursement acceptable to the Bank and the GEF which will be established in the concession contracts, as follows:

(a) the SHS is considered installed when the concessionaire presents evidence to the PG that (i) the consumer has paid the installation fee, and (ii) the PRA has certified the SHS meets installation and operation standards;

(b) the Bank Loan will disburse no more than US\$3.2 for each Watt peak of SHS installed by a concessionaire;

(c) the GEF Grant will disburse decreasing fixed amounts for each SHS of 50-Watt peak, or 70-Watt peak, or 100-Watt peak installed by the concessionaire, as shown in table below. In the table, Year 1 begins on the date the concession contract is signed.

**GEF Grant Disbursement (US\$/unit of SHS)**

SHS size	Year 1	Year 2	Year 3	Year 4	Year 5
50Wp	125	125	120	105	70
70Wp	105	105	100	90	60
100Wp	85	85	80	70	45

14. The Bank Loan and GEF Grant will disburse 100 percent of selected contracts under Categories 2 (consultants) and 4 (project administration) and selected activities under Category 3

**Table A: Project Costs by Procurement Arrangements**  
(in US\$million equivalent)

Expenditure Category	Procurement Method					Total Cost (including contingencies)
	ICB	NCB	LS	PORC	Other	
<b>1. Payment for Installed Goods</b>						
<b>1.1 By existing concessionaires</b>						
- SHS in households	66.7 (16.2) [4.3]	11.6 (2.8) [0.8]	2.9 (0.7) [0.2]			81.2 (19.7) [5.2]
- SHS in public services	8.0 (2.0)	1.5 (0.4)	0.4 (0.1)			9.9 (2.5)
- Other systems				2.7		2.7
<b>1.2 By new concessionaires</b>						
- SHS in households				70.6 (16.6) [4.2]		70.6 (16.6) [4.2]
- SHS in public services				4.7 (1.2)		4.7 (1.1)
- Other systems				2.9		2.9
<b>1.3 Turnkey WHS pilot projects</b>	0.6 [0.4]					0.6 [0.4]
<b>2. Goods for the PCU</b>			0.2 (0.2)			0.2 (0.2)
<b>3. Consultant Services</b>						
<b>3.1 Studies by Secretariat of</b>					2.2 (1.1)	2.2 (1.1)
<b>3.2 Assistance in developing Renewable Energy Systems</b>					3.5 (1.0) [2.4]	3.5 (1.0) [2.4]
<b>3.3 Project Administration</b>					7.0 (3.2) [1.4]	7.0 (3.2) [1.4]
<b>4. Training</b>					1.1 (0.5) [0.4]	1.1 (0.5) [0.4]
<b>5. Front end fee</b>					0.5 (0.5)	0.5 (0.5)
<b>Total</b>	75.4	13.1	3.5	80.9	14.3	187.2
<b>(Bank Loan)</b>	(18.2)	(3.2)	(1.0)	(17.8)	(6.3)	(46.5)
<b>[GEF Grant]</b>	[4.7]	[0.8]	[0.2]	[4.2]	[4.2]	[14.0]

Figures in parenthesis ( ) are the amounts to be financed by the Bank Loan

Figures in parenthesis [ ] are the amounts to be financed by the GEF Grant

ICB: International Competitive Bidding

NCB: National Competitive Bidding

LS: Local Shopping

PORC: Procurement under Own Rules of Concessionaires

**Table B: Prior Review Thresholds**

Expenditure Category	Type of Procurement	Prior Review	Contract Value
<b>1. <u>Installed Goods</u></b>	ICB (by existing concessionaires)	All	>US\$350,000
	NCB (by existing concessionaires)	All	>US\$200,000
	ICB for concession contracts (by provincial governments)	All	Any value
	ICB (Pilot wind systems)	All	>US\$350,000
	NCB (Pilot wind systems)	All	>US\$200,000
<b>2. Goods for the PCU</b>	Prudent shopping	Bid evaluation reports	>100,000
<b>3. <u>Consultant Services</u> (PCU and PIU staff, and Roster of Consultants)</b>	QCBS or QBS	All documents	>US\$100,000
	CQ/I	Short list, TORs and CVs	>US\$50,000
	SSS/I	TORs and CVs	Any value
<b>4. <u>Training</u></b>	Other ad-hoc	All	>US\$20,000

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Table C1: Allocation of Bank Loan Proceeds

Expenditure Category	Amount in US\$million	Financing Amount (US\$) or Percentage (%)
<b>1. Installed Goods</b>		
(a) Solar Home Systems, by existing concessionaires	17.7	US\$3.2 per Watt-peak installed by concessionaires
(b) Solar Home Systems, by new concessionaires	15.2	
<b>2. Goods for the PCU</b>	0.2	79 % of expenditures
<b>3. Consultant Services</b>		
(a) Market studies	0.1	20% of expenditures
(b) Assistance in developing Renewable Energy Systems	0.9	30% of expenditures
(c) Studies by Secretariat of Energy	1.1	50% of expenditures
(d) PCU Staff and consultant's roster	2.2	70% of expenditures
(e) PIU project coordinators	0.6	70% of expenditures
<b>4. Training</b>	0.5	55% of expenditures
<b>5. Front end fee</b>	0.5	100% due at effectiveness
<b>6. Unallocated</b>	7.5	
<b>Total</b>	<b>46.5</b>	

Table C2: Allocation of GEF Grant Proceeds

Expenditure Category	Amount in US\$million	Financing Amount (US\$) or Percentage (%)
<b>1. Installed Goods</b>		
(a) Solar Home Systems, by existing concessionaires	4.8	See Table in paragraph 11
(b) Solar Home Systems, by new concessionaires	3.9	See Table in paragraph 11
<b>2. Turnkey contracts for the pilot WHS sub-projects</b>	0.4	70% of expenditures
<b>3. Consultant Services</b>		
(a) Market studies	0.5	80% of expenditures
(b) Assistance in developing Renewable Energy Systems	1.9	70% of expenditures
(c) PCU Staff and consultant's roster	1.1	30% of expenditures
(d) PIU project coordinators	0.3	30% of expenditures
<b>4. Training</b>	0.4	45% of expenditures
<b>5. Unallocated</b>	0.7	
<b>Total</b>	<b>14.0</b>	

**Table D: Consultant Services – Selection Method**

Description	Total Amount US\$ thousand	Selection Method
<b><i>Technical Assistance to the SE for Strengthening the Regulatory Framework</i></b>		
Competition in power transmission and distribution	400	QCBS
Catalog of hydroelectric projects for private participation	250	QBS
Energy options for export	750	QCBS
Policy on use of renewable energy in urban and rural areas	150	QBS
Revision of policy on efficient use of energy	200	QCBS
Environmental status of the power sector	150	QBS
Panel of international experts on power sector regulation	200	CQ/I
<b><i>Technical Assistance on renewable energy technology</i></b>		
Market studies	600	QCBS
Standards and certification for photovoltaic systems	300	QCBS
Promotion and public education campaign	750	CQ/I
Feasibility studies on centralized renewable energy systems	400	QCBS
Database on solar resources	200	QCBS
Database on wind resources	250	QCBS
Study to match existing direct current appliances to SHS	200	QBS
Workshops for rural concessionaires and regulators	700	CQ/I
<b><i>Training</i></b>		
Experts	300	CQ/I
<b><i>Project Administration</i></b>		
National Project Coordination Unit (PCU)	350	SSS/I
	700	CQ/I
Provincial Implementation Units (PIU)	2,000	CQ/I
UNDP Procurement Services	150	RP

**Key to Selection Method:**

- QCBS = Quality and Cost-Based Selection
- QBS = Quality Based Selection
- CQ = Consultant's Qualification only
- SSS = Single Source Selection
- I = Individual Consultant
- RP = Reserve Procurement (financed by the GOA)

**Project Processing Budget and Schedule**

**A. Project Budget (US\$000)**

**Planned**  
(At final PCD stage)

**Actual**

307

**B. Project Schedule**

**Planned**  
(At final PCD stage)

**Actual**

Time taken to prepare the project (months)

First Bank mission (identification)

07/19/1995

07/19/1995

PDF approval

03/19/1996

03/19/1996

Appraisal mission departure

04/27/1998

04/27/1998

Negotiations

05/03/1998

08/24/1998

GEF Council approval

11/04/1997

CEO Endorsement

09/19/1998

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Secretariat of Energy

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GEF France: \$300,000

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08/15/2011  
12/15/2011

to review the project  
and determine if the  
project is feasible  
and if the project  
is feasible

CEO Approval  
Project Plan of EBP

07/15/2011  
08/15/2011  
09/15/2011

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of Climate Change Project

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project preparation team. Ake  
reviewer was Christian de Oro

### **Documents in the Project File**

**1. Project Implementation Plan**

**2. Documents prepared by the Secretariat of Energy (SE):**

- ⇒ Profundización de Estudio de Mercados Rurales en Cinco Provincias Argentinas, February 1998.
- ⇒ Metodología Tarifaria y Evaluación Económica, Marzo 1998
- ⇒ Modelo de Aplicación del Proyecto en una Provincia
- ⇒ Informe del consultor UTE, November 1997
  - Informe final
  - Recurso Eólico
  - Descripción y Evaluación del Recurso Eólico
  - Descripción del Recurso Solar
  - Costos de Equipamiento Fotovoltaico
  - Descripción del Recurso Hidráulico
  - Costos de Equipamiento Hidráulico
  - Beneficios Ambientales Globales
  - Costos Incrementales
  - Informe de las Concesiones de los Mercados Dispersos en Jujuy y Salta
- ⇒ Marco Legal para la Implementación del Proyecto, July 1998

**3. Bank Working Papers:**

- ⇒ Project Cost and Financing
- ⇒ Economic Assessment
- ⇒ Technical Details of Renewable Energy Systems
- ⇒ Terms of Reference for the Wind Home Systems (WHS) Pilot Subproject
- ⇒ Terms of Reference for the Technical Assistance to Strengthen the Regulatory Capability
  - Terms of Reference for the Technical Assistance on Renewable Energy Systems
- ⇒ Terms of Reference for the Project Coordination Unit
- ⇒ The National Regulatory Power Sector Framework
- ⇒ Guidelines for tariff calculation
- ⇒ Principles governing the design of Concession Contracts

**4. Other documents:**

- ⇒ Independent evaluation of SHS costs.
- ⇒ Evaluación del Sistema de Gestión Financiera
- ⇒ Report prepared by the STAP reviewer, August, 1997.

Document prepared by the Government of the State of Mexico

Proyecto de Ley de Fomento de la Energía Renovable  
Febrero 1998

Modelo de Ley de Fomento de la Energía Renovable  
del Poder Judicial  
UTR, November 1997

Informe sobre  
Recursos Físicos  
Desarrollo y  
Desarrollo del

Informe sobre  
Recursos Físicos  
Desarrollo y  
Desarrollo del

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Recursos Físicos  
Desarrollo y  
Desarrollo del

**Argentina**  
**STATEMENT OF IFC's**  
**Committed and Disbursed Portfolio**  
**As of 31-May-98**  
**(In US Dollar Millions)**

FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1960/95/97	Acindar	36.25	16.43	10.00	63.33	11.25	16.43	10.00	13.3
1977/84/86/88/94/96	Alpargatas	24.23	6.05	6.37	89.29	19.23	6.05	6.37	48.7
1978/81/86/87/91/93/96	Minetti	10.00	0.00	10.00	30.00	10.00	0.00	10.00	30.0
1986/89/91/97	Banco Roberts-AL	10.00	0.00	0.00	0.00	10.00	0.00	0.00	0.0
1987	BGN-TBR	.11	0.00	0.00	0.00	.11	0.00	0.00	0.0
1987/89	BGN-Bolland	.13	0.00	0.00	0.00	.13	0.00	0.00	0.0
1987/89/90/96/97	Terminal 6	19.19	0.00	0.00	18.42	15.71	0.00	0.00	13.9
1987/92	BRLP	7.53	0.00	0.00	0.00	0.00	0.00	0.00	0.0
1988/93	Bunge y Born	3.19	0.00	0.00	24.06	3.19	0.00	0.00	24.0
1989	BGN-Algodonera	.16	0.00	0.00	0.00	.16	0.00	0.00	0.0
1989	BGN-Ferrum	.50	0.00	0.00	0.00	.50	0.00	0.00	0.0
1989	BGN-FRIGOTOBA	.08	0.00	0.00	0.00	.08	0.00	0.00	0.0
1989	BGN-Interpack	.15	0.00	0.00	0.00	.15	0.00	0.00	0.0
1989	BGN-Parafina	.38	0.00	0.00	0.00	.38	0.00	0.00	0.0
1989	BGN-Willmor	.41	0.00	0.00	0.00	.41	0.00	0.00	0.0
1989	ROB-COMESI	.09	0.00	0.00	0.00	.09	0.00	0.00	0.0
1989	ROB-INTA	.09	0.00	0.00	0.00	.09	0.00	0.00	0.0
1989/96	Banco Frances	4.82	0.00	0.00	.13	4.82	0.00	0.00	.1
1990	CIP	0.00	.08	0.00	0.00	0.00	.08	0.00	0.0
1990/94	Petroken	19.39	0.00	5.00	3.65	19.39	0.00	5.00	3.6
1991	BCA	1.26	0.00	0.00	1.60	1.26	0.00	0.00	1.6
1991	ROB-Longvie	.11	0.00	0.00	0.00	.11	0.00	0.00	0.0
1992	FEPSA	6.95	0.00	0.00	5.87	6.95	0.00	0.00	5.8
1992	Oleaginoso Oeste	5.35	0.00	5.00	7.15	5.35	0.00	5.00	7.1
1992	Rioplátense	5.33	1.00	0.00	1.67	5.33	1.00	0.00	1.6
1992	San Jorge	0.00	27.00	0.00	0.00	0.00	0.00	0.00	0.0
1992/93/96	Malteria Pampa	11.49	0.00	1.00	9.20	11.49	0.00	1.00	9.2
1992/95	Bridas	36.29	0.00	0.00	60.30	36.29	0.00	0.00	60.3
1993	Argentina Equity	0.00	4.00	0.00	0.00	0.00	4.00	0.00	0.0
1993	Nuevo Central	5.63	3.00	0.00	8.75	5.63	3.00	0.00	8.7
1993	Yacylec	7.70	5.04	0.00	23.25	7.70	5.04	0.00	23.2
1993/94	Molinos	0.00	5.55	0.00	0.00	0.00	5.55	0.00	0.0
1994	Aceitera General	13.75	10.00	0.00	0.00	13.75	10.00	0.00	0.0
1994	BGN	12.00	0.00	3.00	0.00	12.00	0.00	3.00	0.0
1994	LBAR	0.00	1.17	0.00	0.00	0.00	.64	0.00	0.0
1994	LBAY	0.00	3.62	0.00	0.00	0.00	3.62	0.00	0.0
1994	Quilmes	11.07	0.00	0.00	8.75	11.07	0.00	0.00	8.7
1994/95	EDENOR	16.25	0.00	15.00	66.50	16.25	0.00	15.00	66.5
1994/95/96	Aguas	70.22	7.00	0.00	219.11	70.22	7.00	0.00	219.1
4/95/97	La Maxima	0.00	14.39	4.00	0.00	0.00	12.12	3.96	0.0
1995	Banco Roberts	0.00	0.00	20.00	0.00	0.00	0.00	20.00	0.0
1995	CEPA	11.00	0.00	0.00	2.40	11.00	0.00	0.00	2.4
1995	Mastellone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
1995	NahuelSAT	27.50	5.00	0.00	0.00	27.50	5.00	0.00	0.0

MOP Schedule

ANNEX 3

FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1995	SanCor	17.50	0.00	20.00	21.00	17.50	0.00	20.00	21.00
1995	Socma	18.75	0.00	0.00	50.00	18.75	0.00	0.00	50.00
1995	SIDECO	0.00	15.00	0.00	0.00	0.00	15.00	0.00	0.00
1995	Terminales Port.	9.00	2.00	0.00	0.00	9.00	2.00	0.00	0.00
1995	Tower Fund	0.00	15.73	0.00	0.00	0.00	8.28	0.00	0.00
1995	Tower Fund Mgr	0.00	.14	0.00	0.00	0.00	.04	0.00	0.00
1995/97	Kleppe/Caldero	11.29	0.00	0.00	0.00	7.79	0.00	0.00	0.00
1996	Banco Galicia	30.00	0.00	0.00	200.00	30.00	0.00	0.00	200.00
1996	Bansud	25.00	0.00	0.00	0.00	4.90	0.00	0.00	0.00
1996	Brahma - ARG	17.79	0.00	0.00	29.70	17.79	0.00	0.00	29.70
1996	CAPSA	12.00	0.00	5.00	33.00	12.00	0.00	5.00	33.00
1996	Grunbaum	7.00	0.00	2.00	5.00	7.00	0.00	2.00	5.00
1996	MBA	0.00	.16	0.00	0.00	0.00	.16	0.00	0.00
1996	Neuquen Basin	0.00	26.40	0.00	0.00	0.00	20.69	0.00	0.00
1996	Refisan	20.00	0.00	0.00	30.00	20.00	0.00	0.00	30.00
1996	Transconor	25.00	0.00	20.00	210.00	25.00	0.00	20.00	210.00
1996	Zanon	14.00	0.00	6.00	0.00	14.00	0.00	6.00	0.00
1997	FRIAR	10.00	0.00	2.50	7.00	10.00	0.00	2.50	7.00
1997	Guipeba	15.00	0.00	5.00	0.00	15.00	0.00	5.00	0.00
1997	Milkaut	10.00	0.00	10.00	5.00	10.00	0.00	10.00	5.00
1997	Suquia	0.00	0.00	10.00	0.00	0.00	0.00	10.00	0.00
1997	T61	10.00	0.00	5.00	30.00	10.00	0.00	5.00	30.00
1997	Vicentin	25.00	0.00	0.00	10.00	25.00	0.00	0.00	10.00
1998	FAID	0.00	5.00	0.00	0.00	0.00	1.93	0.00	0.00
1998	Patagonia	5.00	0.00	1.00	0.00	2.00	0.00	1.00	0.00

Total Portfolio:

660.93	173.76	165.87	1,274.13	593.32	127.63	165.83	1,179.13
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## Approvals Pending Commitment

		Loan	Equity	Quasi	Partic
1996	AGUAS III - INC	15.00	0.00	0.00	75.00
1997	ARGIE MAE	0.00	.40	0.00	65.00
1998	AUTCL	12.00	0.00	0.00	0.00
1998	AYG	.45	0.00	0.00	0.00
1998	F.V. S.A.	12.00	0.00	4.00	0.00
1993	FEPSA (II)	0.00	0.00	0.00	4.00
1998	HOSPITAL PRIVADO	10.60	0.00	0.00	0.00
1998	MERCANTIL ARG.	20.00	0.00	15.00	0.00
1998	PATAGONIA FUND	0.00	30.00	0.00	0.00
1998	SUQUIA CL	30.00	0.00	0.00	50.00
1997	TGN II BLINC	0.00	0.00	0.00	10.00
1998	U.BELGRANO	22.00	0.00	0.00	0.00

Total Pending Commitment:

122.05	30.40	19.00	204.00
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# Status of Bank Group Operations in Argentina IBRD Loans and IDA Credits in the Operations Portfolio

					Original Amount in US\$ Millions			Difference Between expected and actual disbursements a/	
Project ID	Loan or Credit No.	Fiscal Year	Borrower	Purpose	IBRD	IDA	Cancellations	Undisbursed	Orig Fm Rev'd
Number of Closed Loans/credits: 56									
Active Loans									
AR-PE-50713	IBRD43140	1998	MINISTRY OF ECONOMY	MODEL COURT DEV.	5.00	0.00	0.00	5.00	0.00
AR-PE-50714	IBRD43130	1998	REPUBLIC OF ARGENTINA	SECOND. ED 3	119.00	0.00	0.00	119.00	34.60
AR-PE-51693	IBRD42190	1998	GOVERNMENT	P.REF(SALTA)	75.00	0.00	0.00	75.00	0.00
AR-PE-51694	IBRD42200	1998	GOVERNMENT	P.REF(S. JUAN)	50.00	0.00	0.00	40.00	0.00
AR-PE-51695	IBRD42180	1998	GOVERNMENT	P.REF(R. NEGRO)	75.00	0.00	0.00	50.00	16.67
AR-PE-52590	IBRD42950	1998	REPUBLIC OF ARGENTINA	NAT RMY RENOVATION	450.00	0.00	0.00	450.00	133.32
AR-PE-55477	IBRD42820	1998	GOVT OF ARGENTINA	MINING TA	39.50	0.00	0.00	39.50	1.54
AR-PE-55935	IBRD42730	1998	GOVERNMENT	EL NINO EMERGENCY	42.00	0.00	0.00	42.00	0.00
AR-PE-6006	IBRD42210	1998	MIN. OF ECONOMY	P.REF(TUCUMAN)	100.00	0.00	0.00	100.00	5.67
AR-PE-6041	IBRD42120	1998	GOVERNMENT	SMALL FARMER DV.	75.00	0.00	0.00	75.00	35.00
AR-PE-6050	IBRD42810	1998	REP OF ARGENTINA	POLLUTION MGT.	18.00	0.00	0.00	18.00	0.00
AR-PE-39584	IBRD41630	1997	GOVT OF ARGENTINA	B.A.URB.TSP	200.00	0.00	0.00	170.26	4.93
AR-PE-40808	IBRD40850	1997	GOA	M.FOREST/PROTC	19.50	0.00	0.00	18.59	-35
AR-PE-43418	IBRD41680	1997	REPUBLIC OF ARG	AIDS PREV. STD CTRL	15.00	0.00	0.00	13.91	1.16
AR-PE-46821	IBRD41310	1997	GOVT OF ARG	PENSION TA	20.00	0.00	0.00	16.71	3.26
AR-PE-49268	IBRD41950	1997	ARGENTINE REPUBLIC	SOC.PROTECT.2	0.00	0.00	0.00	31.04	0.00
AR-PE-5980	IBRD4093A	1997	GOVT OF ARGENTINA	PROV ROADS	300.00	0.00	0.00	297.99	37.65
AR-PE-6010	IBRD40930	1997	GOA	PROV AG DEVT I	125.00	0.00	0.00	122.48	4.59
AR-PE-6052	IBRD41170	1997	GOVT OF ARGENTINA	FLOOD PROTECTION	200.00	0.00	0.00	196.84	5.84
AR-PE-6059	IBRD41640	1997	ARGENTINE REPUBLIC	MTL.CHD.NTR.2	100.00	0.00	0.00	96.67	2.67
AR-PE-34091	IBRD39210	1996	REP OF ARGENTINA	HIGHER ED REFORM	165.00	0.00	0.00	133.66	79.50
AR-PE-35495	IBRD39570	1996	SEC OF SOC.DEVT (OFFICE	SOCIAL PROTECTION	152.00	0.00	0.00	4.09	0.00
AR-PE-37049	IBRD39580	1996	GOVT OF ARGENTINA	PUB.INV.STRENGTH	16.00	0.00	0.00	15.39	9.64
AR-PE-38883	IBRD39600	1996	REPUBLIC OF ARGENTINA	EXT.EXPORT DV.	38.50	0.00	0.00	27.77	2.47
AR-PE-40904	IBRD39260	1996	REPUB OF ARGENTINA	BANK REFORM	500.00	0.00	0.00	166.00	0.00
AR-PE-45687	IBRD40040	1996	REP. OF ARGENTINA	M.INSURANCE TA	25.00	0.00	0.00	8.86	0.00
AR-PE-6030	IBRD39310	1996	REPUB OF ARGENTINA	PROVCL HLTH SCTR DEV	101.40	0.00	0.00	91.13	43.66
AR-PE-6040	IBRD39480	1996	GOVERNMENT	FORESTRY/DV	16.00	0.00	0.00	12.95	36
AR-PE-6055	IBRD39270	1996	GOVT. OF ARGENTINA	MINING SCTR DEVT	30.00	0.00	0.00	10.31	-15
AR-PE-6057	IBRD39710	1996	GOV'T OF ARGENTINA	SECONDARY ED 2	115.50	0.00	0.00	109.71	46.26
AR-PE-5992	IBRD37940	1995	GOVT OF ARGENTINA	PROV DEVT II	190.00	0.00	0.00	149.58	0.00
AR-PE-6018	IBRD38770	1995	ARGENTINE REPUBLIC	MUNIC DEVT II	225.00	0.00	0.00	205.21	0.00
AR-PE-6060	IBRD38600	1995	GOVT OF ARGENTINA	MTNAL CHLD HLTH & M	210.00	0.00	0.00	173.26	-15.14
AR-PE-6025	IBRD37100	1994	GOVT OF ARGENTINA	CAPITAL MGT TA	100.00	0.00	0.00	22.28	12.31
AR-PE-6062	IBRD37100	1994	MIN OF ECONOMY	RD HLTH & REHAB SCT	8.50	0.00	0.00	3.22	3.20
AR-PE-6003	IBRD36110	1993	GOVERNMENT	YACHTS II	340.00	0.00	0.00	82.49	67.21
AR-PE-6036	IBRD35200	1993	GOVERNMENT	TAX ADMIN II	20.00	0.00	0.00	1.01	1.00
AR-PE-6034	IBRD34600	1992	GOVERNMENT	WTR SUPPLY II	0.00	0.00	0.00	0.00	-12
AR-PE-5977	IBRD32810	1991	ARGENTINE REPUBLIC	PROVING DEV PROJ	100.00	0.00	36.00	22.06	58.87
AR-PE-6005	IBRD32800	1991	REPUBLIC OF ARGENTINA	AG SERVICES/INST DEV	300.00	0.00	0.00	19.49	19.47
AR-PE-6009	IBRD32970	1991	GOVT OF ARGENTINA	SEGRA V	33.50	0.00	0.00	1.06	96
AR-PE-5968	IBRD28510	1987	SEGRA		376.00	0.00	0.00	60.48	60.48
					8,390.40	0.00	0.00	3,261.92	97.02

Active Loans Closed Loans Total

Total Disbursed (IBRD and IDA):	2,092.49	7,199.67	9,291.16
of which has been repaid:	226.96	3,117.19	3,344.15
Total now held by IBRD and IDA:	5,137.54	4,174.38	9,311.92
Amount sold :	0.00	12.79	12.79
Of which repaid :	0.00	12.79	12.79
Total Undisbursed :	3,261.92	102.89	3,364.81

- a. Intended disbursements to date minus actual disbursements to date as projected at appraisal.
- b. Rating of 1-4: see OD 13.05. Annex D2. Preparation of Implementation Summary (Form 590). Following the FY94 Annual Review of Portfolio performance (ARPP), a letter based system will be used (HS = highly Satisfactory, S = satisfactory, U = unsatisfactory, NU = highly unsatisfactory): see proposed Improvements in Project and Portfolio Performance Rating Methodology (Sec94-901), August 23, 1994.

Note:  
Disbursement data is updated at the end of the first week of the month.

# Argentina at a glance

8/28/97

## POVERTY AND SOCIAL

	Latin America & Caribbean	Upper-middle-income	Argentina
Population mid-1996 (millions)	479	450	35.1
GDP per capita 1996 (US\$)	4,540	3,710	2,410
GDP 1996 (billions US\$)	2,173	1,790	295.0
Average annual growth, 1990-96	1.5	1.7	2.0
Population (%)	1.5	1.7	2.0
Labor force (%)	1.5	1.7	2.0
Most recent estimate (latest year available since 1989)			
Poverty: headcount index (% of population)	26	28	28
Urban population (% of total population)	73	74	73
Life expectancy at birth (years)	69	69	69
Infant mortality (per 1,000 live births)	35	37	37
Child malnutrition (% of children under 5)	86	80	86
Access to safe water (% of population)	13	13	13
Illiteracy (% of population age 15+)	4	4	4
Gross primary enrollment (% of school-age population)	111	110	107
Male			
Female			

## KEY ECONOMIC RATIOS AND LONG-TERM TRENDS

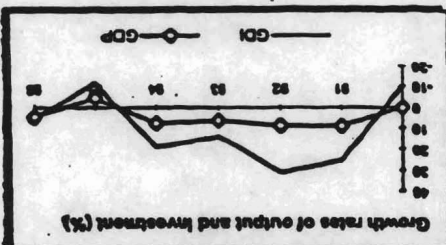
	1975	1985	1996	1996	1997-98
GDP (billions US\$)	52.4	68.4	200.8	300.5	1996
Gross domestic investment/GDP	29.4	17.6	18.3	18.5	1996
Exports of goods and services/GDP	5.8	11.7	8.5	18.1	1996
Gross domestic savings/GDP	29.3	23.1	18.4	18.1	1996
Gross national savings/GDP	28.4	16.8	17.5	17.2	1996
Current account balance/GDP	-2.5	-1.1	-0.9	-1.3	1996
Interest payments/GDP	0.9	5.0	2.1	2.3	1996
Total debt service/GDP	14.7	57.8	32.0	33.2	1996
Total debt service/GDP	44.7	60.1	47.4	48.7	1996
Present value of debt/GDP	..	..	29.5	..	1996
Present value of debt/GDP	..	..	332.1	..	1996
GDP per capita	6.6	2.9	4.4	6.0	1996
Exports of goods and services	5.1	7.6	25.4	7.4	1996

## STRUCTURE OF THE ECONOMY

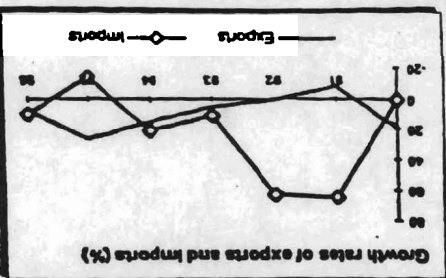
(% of GDP)	1975	1985	1996	1996	1996
Agriculture	6.6	7.8	7.4	7.1	1996
Industry	50.1	39.3	36.0	36.2	1996
Manufacturing	38.2	29.7	26.6	26.7	1996
Services	43.3	53.1	56.6	56.7	1996
Private consumption	58.1	12.6	72.3	73.3	1996
General government consumption	12.6	..	9.4	8.5	1996
Imports of goods and services	6.0	6.3	8.5	8.3	1996
(Average annual growth)	1975-85	1985-96	1996	1996	1996
Agriculture	1.6	1.5	2.3	0.3	1996
Industry	-1.5	2.7	-8.5	4.9	1996
Manufacturing	-1.6	0.9	..	..	1996
Services	2.2	3.3	-3.0	4.6	1996
Private consumption	..	..	-8.6	5.7	1996
General government consumption	..	..	-8.6	-5.4	1996
Gross domestic investment	-3.5	5.7	-11.9	5.4	1996
Imports of goods and services	2.4	14.5	-14.0	10.0	1996
Gross national product	-0.3	3.4	-5.1	4.0	1996

Note: 1996 data are preliminary estimates. Figures in italics are for years other than those specified. Argentina's 1996 average is based on the 1996 average of the 1996 group average. If data are missing, the diamond will

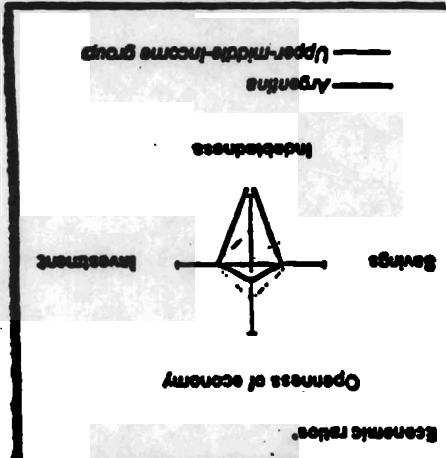
Growth rates of output and investment (%)



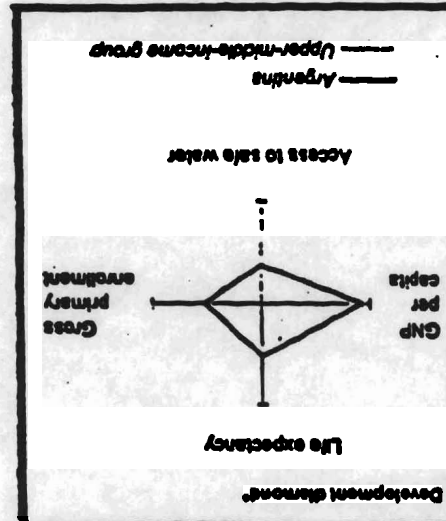
Growth rates of exports and imports (%)



Economic ratios



Life expectancy



# Argentina at a glance

Population	24.5
Area	2,780,000
Capital	Buenos Aires
Language	Spanish

Argentina is a large country with a long coastline on the Atlantic Ocean. It is one of the few countries in the world which has a large area of land under cultivation.

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Approved by: 

Ms. Myrna Alexander  
Director, LCC7C

Date: August 13, 1998

From: The Secretary

## **NOTICE OF INVITATION TO NEGOTIATE**

### **ARGENTINA**

#### **RENEWABLE ENERGY IN RURAL MARKET PROJECT**

The World Bank is inviting representatives from the Argentine Republic to negotiate a proposed Loan of US\$46.5 million equivalent and a GEF grant of SDR 10.5 million (US\$ 14 million equivalent) to help finance the Renewable Energy in Rural Market Project. The negotiations will take place via video conference at the Bank Office in Buenos Aires.

The Bank Loan and the GEF grant would help finance the installation of Solar Home Systems in about 108,000 households, a capacity building program, a training program, and project administration. The project has the following specific objectives: a) provide rural areas with reliable electric supply in a sustainable manner using renewable energy technologies, where feasible; b) support strategic studies and actions at the national level to strengthen the power sector reform; and c) support the Argentine strategy to expand private sector participation in the provision of electricity in rural areas.

#### **Distribution:**

Executive Directors and Alternates  
President  
Bank Group Senior Management  
Vice Presidents, Bank, IFC, and MIGA  
Directors and Department Heads, Bank, IFC and MIGA

**From: The Secretary**

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**Directors and Department Heads, Bank, IFC and MIGA**

**The World Bank**

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT  
INTERNATIONAL DEVELOPMENT ASSOCIATION

1818 H Street N.W.  
Washington, D.C. 20543  
U.S.A.

(202) 477-1234  
Cable Address: INTBAFRAD  
Cable Address: INDEVAS

August 7, 1998

Dr. D. Roque Benjamin Fernández  
Minister  
Ministry of Economy and Works and Public  
Services

Fax No. (541) 349-8815

Mr. Raúl Jorge Baridó, Subsecretario de Control  
Jefatura de Gabinete de Ministros

Fax (541) 345-1391

Mr. Alfredo Héctor Mirkin, Secretario de Energía

Fax (541) 349-8005

Ms. Silvia García, GEF Focal Person

Fax (541) 310-6704

Buenos Aires, Argentina

***Re: Proposed Argentina - Renewable Energy in Rural Market  
Project - Invitation to Negotiate***

I am pleased to invite to our Office in Buenos Aires, a delegation from the Government of Argentina to negotiate a proposed Loan of US\$46.5 million equivalent and a GEF grant of SDR 10.5 million (US\$ 14 million equivalent) for the Renewable Energy in Rural market Project. I propose that Negotiations start at the Buenos Aires Bank Office, on August 24, 1998 at 9:00 AM.

The Bank Loan and the GEF grant would help finance the installation of Solar Home Systems in about 108,000 households, a capacity building program, a training program, and project administration. The proposed project has the following specific objectives: a) provide rural areas with reliable electric supply in a sustainable manner using renewable energy technologies, where feasible; b) support strategic studies and actions at the national level to strengthen the power sector reform; and c) support the Argentine strategy to expand private sector participation in the provision of electricity in rural areas.

As part of the negotiations, the issues indicated in the annex to this letter will be discussed.

As you are aware, in August 1993, the Bank's Board of Executive Directors approved a more open information policy. As a result, the amount of information made

August 7, 1998

available to the public has increased. After the Board approves a project for Bank financing, the Bank releases the project's Project Appraisal Document (PAD) to interested parties on request. Before releasing such report, the Bank takes into account any comments made by the Borrower concerned. Therefore, your delegation for the forthcoming negotiations should be authorized to indicate any text or data in the PAD that may be confidential or sensitive, or that may adversely affect the relations between the Bank and the Government and to clear changes to the wording of the PAD that may resolve any problems related to its release.

Please confirm that the proposed date for the start of negotiations is convenient and advise us of the status of compliance with the conditions for negotiations and the composition of the names of the negotiating team.

Sincerely,



**Myrna Alexander**

**Director**

**Country Management Unit**

**Argentina, Chile and Uruguay**

**Latin America and the Caribbean Region**

**Annex**

August 7, 1998

To be cleared w/ and cc: Mr. Molnar (LEGLA); Kimes (ENVGC)

Cc: Messr./Mmes. D. Leipziger, E. McCarthy, (LCSFP); M. van Praag (LOAEL); M. Alexander, A. Faiz (LCC7F); P. Levy (LCC7C); M. Hagerstrom (LCC7F); L. Cariaga (EDS08); A. Cobarrubias (consultant).



**1. *Agreements to be reached during negotiations:***

- PCU to be set up in accordance with TOR, (particularly, staffing and resources ) acceptable to the Bank;
- TOR for the consultant roster;
- TOR for the studies to be carried out at the national level;
- TOR for the studies to be carried out on renewable energy;
- TOR for the WHS pilot sub-projects;
- Dates to complete the execution of studies, to exchange views with the Bank on the conclusion and recommendations of such studies, and to provide to the Bank a plan of action, satisfactory to the GOA and the Bank, to implement such recommendations (see Annex 2, Table 2.4);
- Final draft of a model bidding document for selecting concessionaires;
- Final draft of a model concession contract for dispersed rural markets;
- Use of Bank's procurement guidelines in the case of existing concessionaires;
- Eligibility criteria for the proposed participating provinces (see Annex 2, Box 1);
- Terms and conditions of the subsidiary agreement to be signed between the SE, the CFE and the eligible PG, which would include:
  - a) conditions to transfer the Bank and GEF funds;
  - b) setting up of the PIU;
  - c) conditions for the participation for existing and new concessionaires;
  - d) accepting support from the PCU to prepare, supervise, and monitor the sub-project;
  - e) facilitating the executing of market studies;
  - f) agreement to set up tariff level and structure in accordance with tariff methodology agreed with the SE and the Bank;
  - g) securing the allocation of FEDEI funds to the project;
  - h) Compliance with environmental safeguards.
- performance indicators to be utilized for project monitoring;
- proper implementation timetable;
- submission of audit report (on project account, and Bank and GEF special account, and SOE of the Bank and GEF) no later than 6 months after the end of the fiscal year;
- submission of quarterly project progress reports, including an executive summary report and a report for each participating province;
- training program for the PG and PRA staff.

**2 *Effectiveness Conditions:***

- the PCU is set up and functioning;
- Agreement between the SE and the procurement agent signed;
- final model bidding document and concession contract for the selection of new concessionaires are acceptable to the Bank;
- final standards bidding document for the procurement of goods to be installed by existing concessionaires acceptable to the Bank.
- Financial management system for the project is set up by the GOA.

3. **Conditions of disbursement for each participating province:**

- for receiving consultant services from PCU:
  - a) market study agreement satisfactory to the Bank, and
  - b) a PIU has been set up satisfactory to the Bank;
- for financing goods and services after concession agreement:
  - a) participation agreement signed by the concessionaire the PG and CFE, by which the former agrees to carry out the project following conditions acceptable to the Bank.
  - b) a concession agreement has been signed by the PG with a concessionaire.

**PROJECT INFORMATION DOCUMENT (PID)**  
**Renewable Energy in Rural Market Project**

***Project Under Preparation Data:***

<b>Country name:</b>	<b>Argentina</b>
<b>Project Name:</b>	<b>Renewable Energy in Rural Market Project</b>
<b>Region:</b>	<b>Latin America and Caribbean Region</b>
<b>Sector:</b>	<b>Energy</b>
<b>Project ID Number:</b>	<b>WB: AR-PE-6043; GEF: AR-GE-45048</b>
<b>Borrower:</b>	<b>Republic of Argentina</b>
<b>Implementation Agency:</b>	<b>Secretary of Energy (SE) Paseo Colón 171, Piso 8 Buenos Aires, Argentina Lic. Monica Servant Head of the Promotion Department Phone/fax: (541) 349 8008</b>
<b>Date this PID prepared:</b>	<b>July 27, 1998</b>
<b>Planned Negotiations:</b>	<b>August 1998</b>
<b>Planned Board presentation:</b>	<b>October 1998</b>

**Country and Sector Background:**

**Project Objectives:** The main objectives of the proposed loan are to: (a) provide rural areas with reliable electric supply in a sustainable manner, using renewable sources where feasible; (b) support the consolidation of the power sector reform strategy of the Government of Argentina (GOA), (c) support the Government strategy to expand private sector participation in the provision of electricity in rural areas; and (d) promote environmentally sound energy resource development in Argentina.

Global GEF objectives are to: (a) remove market barriers to application, implementation, and dissemination of renewable energy sources; and (b) reduce global warming through reducing GHG emissions that would be produced by thermal generation using hydrocarbons.

**Project Description:** The project will consist of: (a) installation and operation in 10 provinces, by private concessionaires of: (i) solar home systems in about 108,000 rural dispersed households; (ii) small decentralized power supply units, range 3 kW to 10 kW each, based on renewable energy systems (RES - photovoltaic, small wind turbines, and mini hydro plants) and diesel units to provide electricity to about 5,900 households living in agglomerated village; and (iii) about 2,900 RES to provide electricity to provincial public institutions (schools, medical centers, police stations); (b) installation of pilot wind home systems in two (2) communities; and (c) a capacity building program consisting of: (i) technical assistance to facilitate: (i) the implementation of the program; (ii) the consolidation of the power sector reform in the country; (iii) the development of the technical and institutional capabilities required for broader adoption

of RES; and (iv) a training program to strengthen the capability of the SE and the provincial regulatory agencies.

**Project Financing:** On a preliminary basis, it is estimated that the total cost of the project will be about US\$187 million, of which US\$46 million would be financed by IBRD, US\$14 million would be financed by a GEF grant, and the balance (US\$127 million) by customers, concessionaires, and the provincial governments through the electrical funds.

**Project Sustainability:** Sustainability of the proposed project would be assured through enabling the strengthening of the provincial regulatory functions and institutions, and appropriate incentives and returns for the concessionaires. Due to the manner by which the financing of individual systems is structured (a mix of GEF grant for incremental costs, GOA lifetime tariffs/connection fee assistance, and consumer payments), full cost recovery is assured from those customers who sign up for services during the project life. In other words, the sustainability of systems installed with project support is assured for the 15 years concession contract period. Beyond the project life, it is expected that new customers could be signed up, even in the absence of the GEF grant, because expansion of the customer base during the project life and achievement of economies of scale would have reduced operational costs by at least the amount of the initial GEF assistance. Project sustainability will be supported through agreed monitoring and implementation actions. A mid-term Review will be scheduled by December 2000 to allow the opportunity for mid-course corrections if necessary. The Bank will also monitor Project Implementation on the basis of quarterly progress reports from the SE, by accounting auditors, and through Bank supervision missions.

**Project Implementation:** The SE will provide the policy framework for rural energy development and overall guidance to the project. A Project Coordination Unit will be set up the SE responsible for general project coordination. An administrative Unit (AU) located within the SE would be responsible for record keeping, reporting functions, and processing disbursement requests for Bank loan and GEF grant. UNDP would assist the SE in handling the hiring of consultants. The GOA will transfer the Bank loan and GEF grant to the provincial governments as a grant. The provincial government, through a project implementation unit, will be in charge of the local coordination and project supervision and monitoring. The provincial regulatory agencies will supervise concession contract compliance. The project will be implemented by existing or new concessionaires. Existing concessionaires will purchase equipment following the Bank's procurement guidelines. New concessions, that would be selected through international competitive bidding, will purchase equipment following its own procurement rules. It is expected that new and existing concessionaires will finance the cost of equipment and its installation using own resources, i.e. before claiming any eligible customer subsidy from the provincial government. The two pilot concessions for the dispersed rural areas of Jujuy and Salta, which were a condition for the Bank to launch a preparation mission, have been in place since November 1996. These concessions, which also supply power to the concentrated market (urban area), have already initiated the installation of RES to public agencies located in the rural dispersed areas. Consultants, financed by the French GEF, are already carrying out market studies in four provinces.

**Environmental Aspects:** The project would reduce environmental impacts by shifting supply from conventional (diesel) fuel sources to non-polluting energy sources. The renewable energy technologies most likely to be used in the project are solar PV, wind turbine, and mini-hydro power units. The project also supports the GEF Climate Change Operational Program "Promoting the adoption of renewable energy by removing barriers and reducing implementation costs". These are environmentally clean and are not expected to pose significant environmental or resettlement problems. This project is classified as "B". The concessionaire during the installation and operation of the equipment will have to prove compliance of on-going operations with existing national regulations, to qualify for Bank and GEF funds disbursements.

***Contact Point:***

***Public Information Center  
The World Bank  
1818 H Street, NW  
Washington, D.C. 20433  
Telephone: (202) 458-5454  
Fax: (202) 522-1500***

from conventional (fossil) fuel sources to non-polluting energy sources. The renewable energy technologies most likely to be used in the project are solar PV, wind turbine, and mini-hydro power units. The project also supports the GEF Climate Change Operations Program. Promoting the adoption of renewable energy by conserving forests and reducing greenhouse costs. These are environmentally clean and are not expected to pose significant environmental or resettlement problems. The project is classified as "B". The construction during the installation and operation of the equipment will be in compliance with existing national regulations to quality. It is a going amount.

Public Information  
The World Bank  
1818 H Street, NW  
Washington, D.C. 20433  
Telephone: (202) 456-54  
Fax: (202)

FINAL PROJECT DOCUMENT

✓ Sales only nre

**1. IDENTIFIERS:**

**PROJECT NUMBER:**

**PROJECT NAME:**

Renewable Energy in Rural Market

**DURATION:**

5 years

**IMPLEMENTING AGENCY:**

World Bank

**EXECUTING AGENCY:**

Secretariat of Energy and Ports (SEP)  
Provincial Governments

**REQUESTING COUNTRY OR COUNTRIES:**

Argentina

**ELIGIBILITY:**

Argentina ratified FCCC on March 11, 1994

**GEF FOCAL AREA:**

Climate Change

**GEF PROGRAMMING FRAMEWORK:**

Operational Program # 6

**2. SUMMARY:**

The project would provide rural areas with reliable electricity supply in a sustainable manner, using renewable sources where feasible. GEF support would facilitate removal of market barriers to application, implementation, and dissemination of renewable energy sources and contribute to reductions of GHG emissions estimated at 1.5 million tons of CO<sub>2</sub>. The project would be implemented in 10 provinces and would consist of installation and operation by private concessionaires of: (i) about 108,000 SHS in rural households; (ii) small decentralized power supply units based on renewable energy to about 5,900 households living in clustered villages; (iii) about 2,900 renewable energy systems to provincial public institutions; and (iv) pilot wind home systems in two communities. The project would also include a capacity building program to support project implementation and to build institutional capabilities necessary for broader adoption of renewable energy technologies.

**3. COSTS AND FINANCING (MILLION US):**

<b>GEF:</b>	-Project	US\$14.0 million
	- PDF:	US\$115,000
	Subtotal GEF:	US\$14.1 million
<b>CO-FINANCING:</b>	-IA:	US\$46.5 million
	-Other International:	N/A
	-Government of Arg:	US\$41.0 million
	-Concessionaires	US\$68.5 million
	-Customers	US\$17.2 million
	Subtotal Co-Financing:	US\$173.2 million
<b>TOTAL PROJECT COST:</b>		US\$187.2 million

**4. ASSOCIATED FINANCING (MILLION US\$)**

**5. OPERATIONAL FOCAL POINT ENDORSEMENT:**

**Name:** Emilio Hamon Pardo

**Title:** General International Cooperation  
Division

**Organization:** Ministry of External  
Affairs, International Commerce, and  
Culture

**Date:** August 29, 1997

PROJECT NAME:  
LOCATION:  
REGION:  
COUNTRY:

PROJECT AREA:  
PROJECT TYPE:  
SUMMARY:

The project would consist of the following activities:  
1. Feasibility study and design of the project.  
2. Procurement of equipment and materials.  
3. Construction of the project.  
4. Commissioning and operation of the project.  
5. Maintenance and repair of the project.  
6. Training of staff and management.  
7. Monitoring and evaluation of the project.  
8. Reporting and documentation of the project.  
9. Handover of the project to the client.  
10. Closure of the project.

Item	Unit	Quantity	Unit Price	Total
1. Feasibility study and design	1	1	15,000	15,000
2. Procurement of equipment and materials	1	1	15,000	15,000
3. Construction of the project	1	1	15,000	15,000
4. Commissioning and operation of the project	1	1	15,000	15,000
5. Maintenance and repair of the project	1	1	15,000	15,000
6. Training of staff and management	1	1	15,000	15,000
7. Monitoring and evaluation of the project	1	1	15,000	15,000
8. Reporting and documentation of the project	1	1	15,000	15,000
9. Handover of the project to the client	1	1	15,000	15,000
10. Closure of the project	1	1	15,000	15,000

Date: 1/1/2000  
Page: 1/1

**6. IA CONTACT:**

Christine Kimes  
LAC Region Tel. # 202-473-3689  
Fax: 202-614-0087  
Internet: [ckimes@worldbank.org](mailto:ckimes@worldbank.org)

Christine Kimms  
LAC Region T24  
Fax: 202-614-00

LA CONTACT

Comparison of Original Concept and Final Project Design				
A. Cost of the Equipment	Number of Customers		GEF Financing, US\$Thousand	
	Original	New	Original *	Proposed
SHS Size				
50 Wp	25,756	58,406	2,665	6,438
70 Wp	0	14,602	0	1,361
100Wp	43,976	11,769	3,885	867
Total	69,726	84,777	6,550	8,665
	Total Cost		GEF Financing	
	Original	New	Original	Proposed
Two (2) pilot sub-projects based on WHS	1,000	600	400	400
<b>B. Technical Assistance</b>				
1. Detailed Market Studies	600	600	500	500
2. Improved Commercial Availability of PV appliances	200	200	200	200
3. Feasibility studies for renewable energy systems	750	400	650	300
4. Improving solar/wind resource information	500	450	400	350
5. Standard and certification systems	500	300	500	200
6. Promotions/public education programs	750	750	500	500
7. Workshop for concessionaires	500	700	400	300
8. Project administration	3,050	6,850	1,350	1,400
9. Training	1,350	1,000	750	400
	8,200	11,240	5,250	4,150
Total: Equipment + pilot WHS + TA:			12,200	13,215
Contingencies			1,300	785
Grand Total:			13,500	14,000



# OFFICE MEMORANDUM

DATE: April 28, 1998

TO: Distribution

FROM: Ricardo Klockner, Task Manager, LCSFP *rk*

EXTENSION: 3-8760

SUBJECT: **ARGENTINA: Renewable Energy in Rural Market Project**  
**Minutes of Decision/Negotiations Meeting**

1. On April 16 and 21, 1998, Ms. Myma Alexander chaired meetings to review the draft PAD of the Renewable Energy in Rural Market Project and to decide on the next steps for project preparation (see Annex 1 for the list of participants). In addition, written comments were received from Messrs./Mmes.: Barnes (IENPD); Kimes (ENVGC); Manibog (LCSES); Molnar (LEGLA); and Rodríguez (LCOPR). These minutes summarize the main conclusions of these meetings.
2. It was agreed that the project is ready for appraisal. It was confirmed that all conditions for appraisal have been met. There was consensus among the participants that: (a) the Government is committed to implementing the project; and (b) the project is consistent with the CAS.
3. The main issues raised during the meeting and comments and recommendations of the participants are summarized below:
  - **Project Size.** The chairperson indicated that it is unlikely that all 16 provinces will participate in the project due to elections to be held next year. The project team confirmed that four provinces are preparing market studies and may start project implementation this current year. It was recommended that the project only include those provinces expected to start project implementation within the next two years. The project team indicated that initially 10 provinces (four the first year, and six the second year) could be considered. At the mid-term review, the Bank could decide if a follow-up new operation is warranted to cover the remaining provinces.
  - **GEF Grant.** ENVGC staff clarified that the project design should be adjusted in order to make it consistent with the GEF Secretariat and Council expectation that the size of the GEF subsidy per household will decline as the market increases with time. The project team agreed and indicated that the arrangements for payment of subsidies will be modified accordingly. As specified in earlier documentation, the GEF grant per unit will be provided at a declining rate that becomes zero at the six year of implementation in the

sold to private operators through public bidding, following Bank's guidelines. The Chairperson recommended that the project team assess the status of preparation of the models of bidding documents and concession contracts.

- **Electrical funds.** The availability of the electrical funds (FEDEI) was raised during the meeting. The Project team indicated that the Consejo Federal de Electricidad in accordance with law 24065 regulates the distribution of these funds by province. The project team also confirmed that the CFE submitted a letter to the Bank showing that the available funds for each province cover in excess the funds required for the project up to year 2002. The chairperson recommended that the availability of these funds and their dedication to the project by the provinces should be described in the loan agreement for eligibility. The project team indicated that this should be a part of the subsidiary letter to be signed between the central government and the province.
- **Procurement.** It was recommended that the project team adjust prior review procurement thresholds by the Bank in order to comply with the thresholds guidelines approved for Argentina. Also, a maximum aggregated amount should be set for hiring individual consultants. The project team indicated that: (a) the aggregated amount should be applied only to short-term consultants, and not for long term consultants, for example, the PCU's staff; and (b) the number of individual consultants to be hired for the project will be agreed during appraisal. The meeting recommended that the use of the proposed consultant roster and the procedure for setting it up be clarified and agreed during appraisal. It was also recommended that the equipment to be purchased by new concessionaires using their own rules should be shown separately in the table of loan disbursement under Other Category.
- **Disbursement.** It was also discussed that the Bank typically disburses on a percentage basis, not on a lump sum basis. The project team indicated the following is acceptable to LOAEL: (a) the application of disbursements based on a lump sum amount; and (b) the declining utilization of the GEF grant. The project team indicated that the PAD (Annex 6) will clearly describe the declining utilization of the GEF grant per year.
- **Project reporting.** The chairperson recommended that the annual project progress report be made available to the public, in order to show the transparency of Bank's project implementation, processing, and use of Bank and GEF funds. The report should cover, at least, the following areas: project implementation status for each province; monitoring indicators as described above, number and amount of contracts (goods and services) approved by the Bank; project cost and financing for each province.
- **Performance Indicators.** The ENVGC staff recommended that a series of new indicators should be added to monitor GEF related activities (see Annex 2). It was also recommended that the result of a survey on public satisfaction, improvement in quality of life, and performance of the regulatory agency be

included. The project team indicated that the implementation of this survey will be included in the TOR of the public promotion and dissemination program which are under preparation. The Chairperson indicated that performance indicators should also demonstrate that the project has created a market for renewable energy beyond the project life.

- **Matrix of Hardware Cost Versus Financing.** The meeting recommended to prepare a matrix, one for each type of investment (solar, wind, mini-hydro, diesel, hybrid) showing the proportion of total per unit cost to be financed by Loan and GEF proceeds, federal funds, concessionaires, and by the users in each of the relevant income categories.
- **Theft of hardware.** The possibility of theft of the equipment was raised during the meeting. The project team explained that the experience shows that this type of theft is negligible. The project team also emphasized that the concession contract should include a clause requiring the concessionaire to insure the equipment against all risks, consistent with appropriate practice.
- **Financial model.** The meeting asked about the status of preparation of the financial model for an efficient concession company and the preparation of the corresponding sensitivity analyses. The project team indicated that the model was already discussed with the Argentine Government and is ready to be used during appraisal. The NPV of the net cash flow of a given size concession will be used as indicator of the magnitude of the business for the private operator. The project is based on a market penetration of about 50%. Sensitivity of the NPV to changes in the number of customers, tariff, equipment costs, O&M, and discount rate will be tested.
- **Opportunity Cost of Capital.** The chairperson recommended verifying the discount rate used by the Bank for long-term investment. It was indicated that the economist of the CMU recommended using 10% as discount rate for long term investments for Argentina. There are no major distortions in trade or exchange rate to warrant a shadow rate. With a moderate level of inflation, the real rate is about 7%, which is close to the potential rate of growth of the economy in Argentina.
- **Next Processing Steps.** The project team indicated that the reduction of project scope will require a recalculation of project cost and financing requirements, and the economic and financial analyses. Also, in line with the comments received, the meeting concurred that the appraisal should last about two weeks in order to ascertain how advanced the implementation status of the project in those provinces expected to start this calendar year. This will require the project appraisal team to meet the corresponding provincial authorities.
- **Conclusion.** Based on above, the chairperson agreed to launch the project appraisal mission on April 27, 1998 mission, postpone negotiation till June, and maintain Board presentation in July 1998.

Cleared w/& cc: Messrs./Mmes. Alexander (LCC7C); Kimes (ENVGC); Van Praag (LOAEL); Rodríguez (LCOPR); Molnar (LEGLA).

**Distribution:**

Messrs./Mmes. Burki, (LCSVP); Perry, Underwood (LCSRP); Ecevit, Matzen (LCODR); Akin-Karasapan, Crown, Grimes, Hughart (LCOQE); Alexander, Faiz, Hagerstrom, Partridge (LCC7C); Araujo, Jiménez, Rodríguez (LCOPR); Koch-Weser, Quintero, Gacitúa-Mario (LCSES); Challa, McCarthy, Lister, de Franco, Vaca-Soto, Schneider (LCSFP); Mc-Allister (OED); Picciotto (DGO); Feinstein, Fankhauser (ENVGC); Collell, Molnar (LEGLA); Van Praag, Gana (LOAEL); Levy (LCC7A).

cc: Chron, Project Files: B= ARPE6043/ARGE45048; IRIS

Renewable Energy in Rural Market Project

Decision Meeting

List of Participants

Name	Unit	Rm. No.	
Myrna Alexander	LCC7C	Buenos Aires	(Chairman)
Ricardo Klockner	LCSFP	I - 5	177
Christine Kimes	ENVGC	S2 -	133
Samuel Fankhauser	ECSRE	H3 -	247
Ferenc Molnar	LEGLA	MC5-	359
Douglas Barnes	IENPD	F2K -	180 (peer reviewer)
Ernesto Terrado	IENPD	F2K -	170
Eugene McCarthy	LCSFP	I5 -	175
Nelson de Franco	LCSFP	I5 -	191
Luis Vaca-Soto	LCSFP	I5 -	165 (peer reviewer)
Alvaro Covarrubias	Consultant		
Mike Jones	Consultant		



List of Participants

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# Argentina Rural Energy: Project Design Summary

Narrative Summary	Key Performance Indicators
<p><b>a. CAS Objective</b></p> <p><b>b. GEF Operational Program: Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs</b></p>	<p><b>(GHG Indicators)</b></p> <p>Avoided household equivalent-kerosene purchases</p> <p>Generated kWh from PV systems</p> <p>Avoided CO2 emissions (target: 1.8 mt CO2 avoided from project outputs)</p>
<p><b>Project Development &amp; Global Objectives</b></p> <p>GO. Provide rural off-grid energy services sustainably through the private sector using renewable energy systems</p>	<p><b>(Market-Impact/Market-Creation Indicators)</b></p> <p>Number of installations of solar home systems by concessions country-wide</p> <p>Overall market share of renewable energy systems in off-grid applications (relative to conventional off-grid energy supply)</p> <p>Installation costs of solar PV systems (per peak watt); operation and maintenance costs (per unit)</p> <p>Market share of renewable energy equipment produced according to standards</p> <p>Proportion of the rural market served by concessions</p>
<p><b>Outputs</b></p> <p>1. Concession contracts for providing electricity services</p> <p>2. Promotion, installation and operation of reduced-cost renewable energy systems by private-sector concessions</p> <p>3. Strengthened regulatory function and capability of provincial governments</p> <p>4. Greater consumer awareness and acceptance of renewable energy systems</p> <p>5. Standards and certification for renewable energy systems</p>	<p><b>(Barrier-Removal Indicators)</b></p> <p>1. Standard concession contracts in place to provide electricity services using renewable energy systems in the rural market (target: 16 contracts by 2002)</p> <p>2. Installations of solar PV systems in households and public agencies by participating concessions (target: 14 MW and 120,000 systems by 2002)</p> <p>2. Installations of mini-hydro plants for small communities by participating concessions (target: 450 plants, 3-10 kW each, serving 13,500 households)</p> <p>2. Installations of pilot wind home systems (target: 2); performance ratings</p> <p>2. Share of renewable energy systems relative to conventional systems installed by participating concessions</p> <p>2. Ratings of capabilities of participating concessions to design, purchase, finance, market, install, operate, and maintain renewable energy systems.</p> <p>3. Regulations enacted by provincial governments that promote renewable energy systems (target: 16 provinces by 2002)</p> <p>3. Ratings of capabilities of provincial governments to regulate markets and concession contracts for renewable energy systems</p> <p>4 (&amp; 2). Ratings of household familiarity with, understanding and acceptance of renewable energy systems; household plans or deliberations to purchase renewable energy systems</p> <p>5. Number of suppliers and installers certified; standards issued</p>



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