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Report No:ICR0000184

IMPLEMENTATION COMPLETION AND RESULTS REPORT
(Loan/Credit No 047309)

ON A

GRANT

IN THE AMOUNT OF SDR 11.9 MILLION
(US$15 MILLION EQUIVALENT)

TO THE

CENTRAIS ELETRICAS BRASILEIRAS S.A. (ELECTROBRAS)

FOR AN

ENERGY EFFICIENCY PROJECT

January 25, 2007

Sustainable Development Department
Brazil Country Management Unit
Latin America and the Caribbean Regional Office

CURRENCY EQUIVALENTS

(Exchange Rate Effective 12/31/2006)
Currency Unit = Real
Real 1.00 = US$0.4658
US$1.00 = Real 2.1467
Fiscal Year
July 1 - June 30

ABBREVIATIONS AND ACRONYMS

ABESCO	Brazil National ESCO Association
APL	Adaptable Program Loan
CAS	Country Assistance Strategy
CBM	Capacity Building Module
CEPEL	Brazil National Electric Laboratory
CO_2	Carbon Dioxide
DP	Demonstration Project
DSM	Demand-side Management
EE	Energy Efficiency
ESCO	Energy Service Company
ESMAP	Energy Sector Management Assistance Program
GEF	Global Environment Facility
GHG	Greenhouse Gas
GOB	Government of Brazil
IP	Integrated Planning
LEE	Law on Energy Efficiency
MME	Brazil Ministry of Mines and Energy
PAD	Project Appraisal Document
PDO	Project Development Objectives
PMU	Project Management Unit
PROCEL	Brazil National Electricity Conservation Program
PSR	Project Status Report
UNDP	United Nations Development Programme

Vice President:	Pamela Cox
Country Director:	John Briscoe

Sector Manager:	Susan G. Goldmark
Project Team Leader:	Todd M. Johnson

BRAZIL
ENERGY EFFICIENCY PROJECT(GEF)

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1. Basic Information

Country:	Brazil	Project Name:	BR ENERGY EFFICIENCY (GEF)
Project ID:	P047309	L/C/TF Number(s):	WBTF-21843
ICR Date:	01/24/2007	ICR Type:	Core ICR
Lending Instrument:	SIL	Borrower:	ELETROBRAS
Original GEF grant amount	USD 15.0M	Disbursed Amount:	USD 11.9M
Environmental Category:	C	GEF Focal Area	C
Implementing Agencies Centrais Eletricas Brasileiras S/A			
Cofinanciers and Other External Partners			

2. Key Dates

Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	02/13/1997	Effectiveness:	08/15/2000	02/07/2001
Appraisal:	10/15/1998	Restructuring(s):		05/07/2003
Approval:	10/05/1999	Mid-term Review:		
		Closing:	12/31/2003	06/30/2006

3. Ratings Summary

3.1 Performance Rating by ICR

Outcomes:	Moderately Satisfactory
Risk to Global Environment Outcome	Moderate
Bank Performance:	Moderately Satisfactory
Borrower Performance:	Moderately Satisfactory

3.2 Quality at Entry and Implementation Performance Indicators

Implementation Performance	Indicators	QAG Assessments (if any)	Rating:
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA):	None
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA):	None
GEO rating before Closing/Inactive status	Satisfactory		

4. Sector and Theme Codes		
	Original	**Actual**
Sector Code (as % of total Bank financing)		
Power	100	100
	Original Priority	**Actual Priority**
Theme Code (Primary/Secondary)		
Climate change	Secondary	Primary
Pollution management and environmental health	Primary	Secondary

5. Bank Staff		
Positions	**At ICR**	**At Approval**
Vice President:	Pamela Cox	David de Ferranti
Country Director:	John Briscoe	Gobind T. Nankani
Sector Manager:	Susan G. Goldmark	Danny M. Leipziger
Project Team Leader:	Todd M. Johnson	Luis M. Vaca-Soto
ICR Team Leader:	Todd M. Johnson	
ICR Primary Author:	Xiaoping Wang	

6. Project Context, Global Environment Objectives and Design

(this section is descriptive, taken from other documents, e.g., PAD/ISR, not evaluative)

6.1 Context at Appraisal

(brief summary of country macroeconomic and structural/sector background, rationale for Bank assistance)

This Implementation Completion and Results Report (ICR) covers only the GEF-financed components of the Brazil Energy Efficiency Project (P047309). A World Bank loan of US$43.4 million was originally associated with the project but there was no disbursement and the loan was cancelled in 2004. The two projects were effectively "de-linked" following the loan cancellation and the restructuring of the GEF project in consultation with OPCS and the GEF. The note for cancelled operations (NCO) for the World Bank loan is attached.

A broad range of measures can be undertaken to improve energy efficiency for both, use of electricity and energy for heat and motive power, these include: (a) policy measures, indirect instruments such as energy tariffs and prices, to direct instruments for instance energy efficiency standards and related legislation; (b) capacity building to strengthen institutions, ranging from utilities, government agencies, commercial banks, or specialized energy efficiency companies (ESCOs); (c) availability of finance from commercial banks, dedicated loan windows from development institutions, or carbon financing; and (d) investments in key energy-consuming sectors such as residential, commercial, industrial, transport, and the public sector.

This project focused primarily on capacity building for improving the efficiency of electricity use by the residential and commercial sectors in Brazil by working through electricity distribution companies and the government program for electricity efficiency, PROCEL.

Macroeconomic Context

This project was prepared in context of the economic conditions and structure of the energy sector in the mid- and late-1990s. A description of the macroeconomic environment and energy sector would be useful to understand the design of the project. Since the deep recession in 1990, Brazil had adopted a comprehensive package of economic reforms that has fundamentally transformed its economy. First, trade liberalization was introduced, including reduction of import tariffs and establishment of the regional trade agreement Mercosul. Second, in 1994, the Real Plan was introduced which featured privatization of state-owned industries, lowering of tariffs, and the abolition of Brazil's unique and counterproductive wage-inflation indexing, which had sent prices on a seemingly endless upward spiral. The Brazilian Real initially appreciated against the U.S. dollar as a result of the large amount of capital inflows in late 1994 and 1995, but then began a gradual depreciation process until January 1999 when an inflation-targeting, free-floating policy was instituted which effectively meant the fixed-exchange rate period was over. In late 2002 the Real reached its historic low of almost R$4 per US$1 in fear of the possible monetary policy change by the then to-be-elected President Lula. Since then the Real has

been getting stronger against the dollar and, since the beginning of 2005, against most other world currencies as well. One of the striking achievements during the 1990s was the reduction of inflation rates from nearly 5000 percent in mid-1994 to 6 percent in 2000. The growth rate of the economy averaged 4.2 percent between 1992-97. After the turmoil of the Russian and Asian Crises in 1998-99, Brazil's growth registered 4.2 percent again in 2000, but this trend did not continue due to the global slowdown, events in Argentina, and the 2001/2002 energy crisis in Brazil (as described below) that constrained economic activity. Despite their recent downward trend, real interest rates in Brazil have been and remain high. The average real interest rate was 21.4 percent in 1997-99, 15.9 percent in 2000-01 and 11.9 percent in 2003-05. The continuing high interest rates are due to a number of factors, including the high level of public debt, limitations on issuing long-term bonds, the high level of government spending, failure to achieve sustained economic growth, and the history and expectations of default and high inflation.

Energy Sector Issues

Up to 1995, Brazil had a centralized, predominantly public sector power system, with most generation and transmission owned by the Government through its holding company, Eletrobrás and its subsidiaries, and by about a half dozen state companies. ITAIPU, a joint Brazilian-Paraguayan hydro undertaking, supplied a quarter of the demand through two utility companies FURNAS and ELETROSUL,. Almost all of the distribution companies were owned by the individual states.

In 1995, the Government initiated a major power sector reform to establish a competitive, more efficient private sector-operated system. The reform led to: 1) privatization of 23 percent of generation assets and 64 percent of distribution assets; 2) creation of a National System Operator (ONS) with responsibility for central cost-based dispatch for the interconnected system; a Wholesale Electricity Market (MAE) and a new federal electricity regulatory agency (ANEEL). However, after the initial successes, the reform lost momentum for several reasons. First, there was a lack of commitment and coordination on the part of the Government, particularly after the financial market crisis in 1999 when the Government shifted its priorities. Second, there was strong resistance to the reform by major regional utilities and local political leaders who did not want to lose control or political influence. Third, there was little sense of an upcoming energy crisis despite warnings that the lack of investment, non-completion of market reforms and progressive depletion of hydro reservoirs were putting the power sector operations at risk.

The Brazilian power system experienced a major supply crisis in 2001 and 2002. As a result, the country was forced to implement an aggressive energy rationing plan from June 2001 through February 2002. Brazil's power generation had been dominated by hydroelectricity which accounted for nearly 90 percent of its total installed capacity. The immediate cause for the energy crisis was a sequence of years drier than usual. However, the structural imbalance between supply and demand and the under-investment in new capacity were believed to be the most important reasons why the system was not able to withstand low rainfall without the need for severe rationing measures. While the market-driven power sector reforms triggered a wave of investments in Brazil, the reforms also led to growing pains within the electricity supply system. There was a lack of

incentives, due to both commercial and regulatory reasons, for distribution companies to sign contracts with electricity suppliers and there was also a "false sense of security" within the electricity industry due to the overestimate of inherited supply contracts that were not backed up with secure physical capacity (see Luiz Maurer et al, ESMAP Report 305/05).

The rationing system consisted of monthly energy consumption targets for almost all consumers and a set of rules for trading quotas, setting bonuses for overachievers and penalties for violators. Quotas were assigned to each individual customer group, amounting to as much as a 35 percent reduction of average consumption in the corresponding three-month period of the previous year. Penalties for non-compliance were severe, reflecting the marginal cost of energy in the wholesale market. The system also allowed the trading of quotas for non-residential consumers. As a result, from June to December 2001, there was a 20 percent load reduction, compared with the previous year's consumption level.

The quota system effectively minimized the damage of the crisis by not resorting to blackouts. Another interesting feature was the use of price signals, which helped to make the program an international best practice on how to implement rationing. There is also evidence that some of the Energy Efficiency (EE) measures adopted by consumers became permanent—one of the positive consequences of the crisis. Nearly three quarters of the consumers who replaced incandescent bulbs with compact florescent lamps (CFL) during the rationing continued using CFLs thereafter according to the market survey by the Brazil National Electricity Conservation Program (PROCEL).

Energy Efficiency in Brazil

In the mid-1990s when this project was conceived, electricity demand in Brazil had been growing at 6-7 percent per year. In order to meet the demand, 27GW of additional capacity was projected for the following 8-10 years. Given that most of the attractive hydropower resources had already been developed, and further expansion of hydroelectric capacity was hindered by the institutional barriers and environmental and social constraints, the additional capacity was expected to be met primarily through fossil fuels. Nonetheless, in retrospect, the 2001/2002 energy crisis demonstrated that the Government's attempt to expand thermal generating capacity did not generate concrete results due to lack of incentives for private companies to invest and for the distribution companies to conclude long-term power purchase agreements (PPA).

The residential and industrial sectors accounted for three quarters of electricity consumption in Brazil in the late 1990s and their share was growing. Per capita residential power consumption increased by nearly 50 percent between 1994 and 2000, only briefly declined during the 2001/2002 crisis, and picked up again after the crisis. According to the preliminary survey that was conducted in mid-2004 with financial support from this project, there is significant potential of energy savings in electricity end-use in the commercial, industrial, water and sewage, government buildings, and residential sectors, possibly amounting to more than R$2.7 billion per year.

Brazil has long had two government programs to promote energy efficiency, administered separately for electricity and fuels through the two parastatals, Eletrobrás and Petrobras. The PROCEL program for electricity was established in late 1985 and has been managed by Eletrobrás. The National Program for Rational Use of Oil and Natural Gas Derivatives (CONPET) program for efficiency in the consumption of oil and gas was established in 1991 and is managed by Petrobras. CONPET is mostly focused on initiatives in the transport sector, and is substantially smaller than PROCEL. In addition to PROCEL, there are two other programs for electricity efficiency that were established later in the 1990s. One is the wire-charge on electricity distribution utility company revenues for energy efficiency which is regulated by ANEEL, the regulator for the power sector; the other is the RELUZ program for improving efficiency in public lighting using the resources of Eletrobrás. Both programs operate through the distribution companies and finance projects developed by them. Since established, at least 55 percent of the wire-charge EE investments have gone for improving the efficiency for public street lightings because this was an area of importance for the distribution companies as it would reduce the most expensive peak demand. At the same time, the RELUZ can finance up to 75 percent of the investments for public lighting projects. Thus public lighting has been the overwhelming beneficiary of EE programs in Brazil, even though this segment is responsible for only 3 percent of overall electricity consumption.

Because this project was conceived to support the further development of the PROCEL program, it is worth describing the program in more detail. The basic PROCEL program operates by funding or co-funding EE activities such as R&D; education and training; testing, labeling and standards and marketing. It has subprograms for public buildings, water and sewage, energy management in municipalities, the PROCEL seal, new buildings, industry and public lighting. In its first years, this program stimulated many audits of electricity use, but relatively few investments in retrofits. While the PROCEL program suffered along with the macro-economy in the early 1990s, it was re-activated in 1994. The energy savings achieved by PROCEL since 1994 are quite substantial, as shown in Table 1. Using US$110 million in authorized investments between 1995 and 2000, PROCEL achieved savings of more than 10 TWh in electricity consumption, thereby averting the need for more than US$3.6 billion in investments. However, since 1997, the PROCEL budget has decreased sharply and the program has been downsized. The rationale for the reduction has been that many of one-time investments in energy efficiency capacity have been made (testing labs, EE institutions) and that utilities are best able to detect the best opportunities for cost-effective investments.

Table 1 Investments and Results Achieved by PROCEL (1994-2005)

Results	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Approved investments (US$ millions)	3.3	10.3	17.2	42.1	17.2	13.8	9.0	12.9	20	19.5	45.0	47.0
Saved electricity (GWh/yr)	344	572	1970	1758	1909	1862	2300	2500	1270	1817	2373	2158
Avoided demand (MW)	70	103	293	976	532	418	640	600	309	453	622	585
Avoided Investment (US$ millions) *	120	202	693	592	672	655	808	880	450	639	834	760

Source: ESMAP (2006), Developing financial intermediation mechanisms for energy efficiency projects in Brazil, China and India: Brazil country report, with updates from http://www.eletrobras.com.br/elb/procel/main.asp
(*) US$1,00 = R$ 2,10 (For every year)

The Energy service companies (ESCO) sub-sector in Brazil emerged in the mid-1990s when several EE programs and energy policy changes contributed to the growth of the market for energy efficiency services. The logic for ESCOs is that they reduce the risk of the host company by guaranteeing the energy savings and the need for the host to undertake balance-sheet financing for the energy efficiency investments. There are actually few ESCOs in Brazil in the strict sense of operating on performance contracts and providing financing. More appropriately, they are firms that provide energy consulting services (usually on a fee for service basis unrelated to energy efficiency performance). The growth of the energy efficiency market in Brazil has been driven by: (1) the increase in electricity prices, decrease in inflation, and fall in duties for imported EE goods and equipment which improved the economics of many projects; (2) the reactivation of PROCEL which heightened awareness among consumers of the opportunities and benefits of EE measures for electricity; (3) the electricity rationing in response to the energy crisis; (4) the wire-charge program and mandatory investments in energy efficiency by electricity distribution companies; and (5) more recently, entry of natural gas in Brazil and the general increase in electricity prices of moving away from hydro, which has induced more efficient use of energy. However, according to the ESMAP-funded three-country study report on developing financial intermediation mechanisms for energy efficiency projects in Brazil, China and India (2006), the majority of ESCOs in Brazil are small-sized companies with less than 10 employees. At most a dozen companies are capable of executing the activities expected from an ESCO. Contrary to expectations, after the privatization of electric utilities, only one ESCO was created and currently operates as a subsidiary of the utility. This demonstrates the lack of incentives that utility companies continue to have to focus on energy efficiency. Financing was considered to be the most serious barrier to realization of ESCO projects, and this remains a problem. There are a number of other barriers to ESCO

development in Brazil, including clients underestimating what is involved in implementing EE measures, low importance attached to projects which do not increase the quality or quantity of production, and the related hesitation of corporate management to take decisions on technical operational investments to lower production costs. These issues highlight the need to improve access of ESCOs to financing and to educate consumers and industry on the benefits of energy efficiency.

Project Rationale

The energy sector environment at the project preparation stage was characterized by greater reliance on markets in shaping the structure of the sector; competitive sector participation becoming the norm, with private firms assuming greater operational tasks, with the Government playing more of a regulatory role; imported natural gas soon reaching major metropolitan areas and play a more important role in the future, thus allowing greater fuel choices for electricity generation and end-users; increasingly cost-based energy prices fueling greater customer interest in the more efficient use of energy; local capital markets beginning to look at financing energy sector investments; and the Government moving from its past function of being the main investment player for energy conservation programs in favor of a more market-based strategy.

The above-described environment provided a foundation for undertaking EE measures in Brazil. However, other barriers were still apparent, including, but not limited to: (a) the lack of public awareness of potential benefits, (b) the lack of credible information on effective EE measures, and (c) the lack of information, financial, and regulatory support mechanisms.

The proposed project was to support the Government's goal to move toward a market-based EE strategy. The project consisted of a GEF grant of US$15million. The GEF grant was to help remove barriers (a) – (c) above by: (1) providing core support to the implementation of EE market-based measures by utilities and consumers, including information dissemination of best practice cases, public awareness programs, new financial instruments and contractual arrangements, and labels and standards, and (2) providing capacity building activities targeted to federal and state regulators and energy agencies. Without the GEF assistance, it was envisioned that information dissemination on EE practices would remain hampered without the dissemination of best practices and the monitoring of savings. Institutional capacity to implement innovative EE measures would remain fragmented and, most likely, remain at a central level. Participation of private investors and ESCOs would be retarded if commercial instruments, like performance contracting, were not introduced in the EE market. The Bank involvement would incorporate its experience in international best practices into project design and implementation.

6.2 Original Global Environmental Objectives (GEO) and Key Indicators (as approved)

This project was designed to support an Energy Efficiency Program in Brazil. The global environmental objective of the project was to reduce greenhouse gas emissions by increasing the efficiency of energy supply and use in Brazil using a market-based approach.

The project objective was fully consistent with GEF Operational Program No. 5, namely the removal of barriers to EE and energy conservation. The objective of OP5 is the dissemination of least-economic cost energy-efficient technologies and the promotion of the efficient use of energy. The EE program would reduce the risk of climate change by mitigating greenhouse gas (GHG) emissions, which would help Brazil to meet its commitments under the United Nations Framework Convention on Climate Change through intensified national efforts to improve energy efficiency in various sectors.

The key indicators, as set out in the PAD, include: (1) reduction of CO_2 emissions (19.2 million tons in a 10-year period); (3) energy savings of 20.8 TWh over a 10-year period (PAD Annex 4 of Project Justification); and (4) postponement of investments in electricity supply (US$300 million per year) over a 10-year period. It is worth noting that the target values for these indicators were set to be achieved in two phases over 10 years, but the project being evaluated only covers Phase I for which no intermediate target values for these key indicators are available.

6.3 Revised GEO and Key Indicators (as approved by original approving authority), and reasons/justification

There was no change to the project GEO of increasing energy efficiency in Brazil even though the project was restructured in 2003 (see Section 6.6 on the changes as a result of the restructuring). The three key indicators remain relevant although their target values cover a much longer period than the project life. The project output indicators, as approved in project restructuring, are shown in Table 2.

Table 2 Project output indicators as approved in the 2003 project restructuring

	Project Output	Key Indicators	Revised Baseline at the time of restructuring	Target	Actual Achievement
ENT A	The market for the EE products and services is working better through improved information and market procedures, Completion of EE activities funded by IBRD and GEF	Number of Solar Water [illegible] Equipments (structure of CEPEL/RJ Laboratory) Solar Heating systems Completion of [illegible] Fully operative [illegible] by CEPEL	0 0 percent	210 100 percent	210 100 percent

	EE Financial Facility is established, operated by a qualified financial entity and demonstrated ability to assess, appraise and find necessary funding of qualified EE market-based subprojects based on agreed operational practices and eligibility criteria.	Number of financial facility projects developed	0	15	0 (this component was cancelled later)
	The market for EE products and services is working better through improved information and market procedures, with a system to evaluate global market performance. In order to reach this goal, the CEPEL laboratory is fully operative.	Goniophotometer is fully operative (structure of CEPEL/RJ Laboratory)	0 percent	100 percent	100 percent
		Solar Heating systems laboratory tester is fully operative (PUC/MG Laboratory)	0 percent	100 percent	100 percent
		Hydraulic systems laboratory tests is fully operative (EFEI/MG Laboratory)	0 percent	100 percent	100 percent
		Definition of EE Standards to comply with Energy Efficiency law	0 percent	100 percent	0 (this component was cancelled later)
	Research on the industrial, commercial, residential and public sectors with the aim of updating the information about the acceptance of the efficient equipments by the market has been completed.	Research on Industrial sector is done	0 percent	100 percent	100 percent
		Research on Commercial sector is done	0 percent	100 percent	100 percent
		Research on Residential sector is done	0 percent	100 percent	100 percent
		Research on Public sector is done	0 percent	100 percent	100 percent
COMPONENT C	An enhanced program management unit exists with capability to learn by doing and adapt the EE program based on evaluation of market performance of EE activities and participants. Moreover, strategically people linked to the Brazilian educational system are capable to understand and promote the Energy Efficiency Program.	Number of people that received technical training	0	1800	2650
		Number of courses developed to Undergraduate and Graduate levels.	0	6	86 (covering 18 subjects)
		Number of Technical Guides published	0	2	5 (1 technical guide and 4 technical books)
		Number of Best Practice Cases Published	0	10	10 (4 specialized manuals; 6 best practice cases)
		Video conference facility is fully operative	0 percent	100 percent	100 percent

		Enhancement of Program Monitoring and information system, project management unit is fully established and counterpart staff is selected.	0 percent	100 percent	100 percent

6.4 Main Beneficiaries, original and revised
(briefly describe the "primary target group" identified in the PAD and as captured in the GEO, as well as any other individuals and organizations expected to benefit from the project)

The original beneficiaries included the target consumer groups of specific programs supported by the GEF funding. The project was expected to have ripple effects starting with a small group of direct beneficiaries and then reaching the entire country directly or indirectly through replication, national standards, and information dissemination. While the direct beneficiaries for the one demonstration project are obvious—i.e. the user of solar water pre-heaters, those for information dissemination (e.g., TV campaigns and other marketing campaigns) and standards and labels are relatively difficult to define because they target the entire population with electricity access.

After the project restructuring and cancellation of some subcomponents, direct beneficiaries changed. ESCOs and consumers which would have benefited from the financial facility component were no longer direct beneficiaries due to the cancellation of this component. In addition, the state and federal governments and energy agencies which would have benefited from the capacity building component were no longer direct beneficiaries of this project. Some of the actions under these components were financed under the Bank's Energy Sector Technical Assistance Project for Brazil. However, the entire population with electricity access still benefits from the nationwide energy efficiency marketing campaign, information dissemination and the testing, and certification and labeling program financed by the project.

6.5 Original Components (as approved)

Component A: Demonstration Projects (Total cost US$90.2 million, including GEF US$3.3 million)

The GEF grant was designed to support: (a) transitory financial incentives to energy users to facilitate demonstration of innovative technologies and delivery arrangements through demonstration projects; and (b) monitoring and evaluation studies that will contribute to the preparation of "best practice" case studies.

Component B: Core Support Activities

This component was designed to facilitate replication of the demonstration projects and other financially sound EE projects. It included:

(a) Information dissemination, and marketing programs, including a Best Practice Program.

(Total cost US$8.9 million, including GEF US$3.4 million)

(b) Implementation and initialization of a financial facility to support EE measures by ESCOs and consumers, including building a portfolio of EE projects and preparing them for commercial financing by third parties. (Total cost US$5.2 million, including GEF US$1.6 million).
(c) Implementation of programs for testing, certification, and labeling of efficient equipment and appliances, including motors, lamps, lighting ballasts, refrigerators, freezers, air conditioners, and solar and heat pump water heaters. (Total cost US$3.4 million, including GEF US$1.3 million)

(d) Research activities to improve the evaluation of its EE programs and evaluate their impact in the energy market. These assessments would include: (i) commercial and public buildings sector surveys; (ii) industrial sector surveys; (iii) energy efficiency potential; (iv) global market evaluation; and (v) social and environmental impacts. (Total cost US$2.7 million, including GEF US$0.9 million)

Component C: Capacity Building Module (CBM)

This component was designed to reinforce the institutional capacity of public energy agencies, regulators, and other participants in the EE market to implement EE measures. It would finance:

(a) Training and Education which included: (i) Technical Training on reducing commercial and technical losses, ESCO development support, building energy management, end-use EE programs, and regulatory issues; (ii) Management and Administrative Training on bidding and procurement procedures and on project management for project managers in PROCEL, participating utilities, and state agencies on physical and financial control systems and the new project analysis data system; (iii) PROCEL in Public and Private Schools; and (iv) PROCEL in Technical Schools and Universities. (Total cost US$3.8 million, including GEF US$1.3 million)

(b) Support to Federal and State Energy Agencies and Regulatory Organizations. (Total cost US$5.8 million, including GEF US$2.2 million)

(c) Support to Project Management. Evaluation and Information Systems. (Total cost US$5.5 million, including GEF US$1.0 million)

6.6 Revised Components

The project was restructured in May 2003 and there were some subsequent changes to the GEF-funded activities that the Bank agreed with the borrower. The rationale for project restructuring and other changes is discussed below.

During 2001 Brazil experienced a major energy supply crisis as a result of a prolonged drought, compounded by the country's heavy dependence on hydroelectric energy, and under-investment in energy supply capacity for a number of years. As a result of the

electricity supply shortages, the Government was forced to institute a power rationing program from May 2001 to February 2002, which was highly successful in achieving voluntary (subject to high above-quota tariffs) consumption reductions. However, this fall in consumption reduced electricity distribution companies' revenues, with severe negative impact on their finances. Moreover, it was expected that electricity consumption would remain 10 percent below the pre-crisis levels in the next 12 month after the rationing. Because of regulatory lag, distribution tariffs remained depressed and distribution companies continued to face cash shortfalls. As a result, their attention was focused on reducing their own costs and had little incentive to promote energy efficiency initiatives, such as the ones envisaged by Component A demonstration projects. In addition, companies in financial difficulty wanted to avoid borrowing in dollars and increasing their exposure to foreign exchange risks. Due to the lack of progress in the implementation of Component A, in November 2002, Eletrobrás requested partial cancellation of the funding to this component to be in line with the actual demand for resources to finance energy demonstration projects.

In May 2003, the Bank Board of Directors approved the project restructuring package which included partial cancellation of the Bank loan and the strengthening of the testing and labeling program, among other changes. The reasons for strengthening the testing and labeling program were as follows. The original Project concept was to use component A (Demonstration Projects) to attract consumers' attention to the potential savings to be gained from energy efficiency projects. Components B and C would then disseminate information about energy efficiency best practices. During the power rationing that was in effect in 2001, consumers were persuaded to reduce their consumption by 20 percent on average. During that period, sales of PROCEL certified high efficiency light bulbs increased four times in relation to sale levels prevailing before the rationing period. The rationing program turned out to be a startling lesson about the possibilities for energy conservation and efficiency, though less was learned on the long-term effects on consumer behavior from the short-term rationing program. In the restructured project, Component B was to be used to capitalize on the newly acquired customer awareness of the importance and potential for energy efficiency and was thus strengthened with an elevated level of funding (see Table 3).

The changes to the project financing structure over the project life are shown in Table 1. The changes to specific project activities are described below.

Table 3 Project Financing Structure Over Project Life

Component	Original	2003 Project	Actual
A. Demonstration	Total: 90.2	Total: 0.5	Total: 0.5
B. Core Support			
a) Information and	Total: 8.9	Total: 15.06	
b) Financial facility	Total: 5.2	Total: 1.68	Dropped
c) Testing, Certification	Total: 3.4	Total: 5.47	
d) Market assessment	Total: 2.7	Total: 4.16	

	GEF: 0.9	GEF: 1.50	GEF: 1.32
C. Capacity Building			
a) Training	Total: 3.8 GEF: 1.3	Total: 3.39 GEF: 0.76	GEF: 1.58
b) Support to agencies	Total: 5.8 GEF: 2.2	Total: 0.0 GEF: 0.0	Dropped
c) Project management	Total: 5.5 GEF: 1.0	Total: 5.24 GEF: 0.99	GEF: 0.57

Component A: Demonstration Projects

As a result of the 2003 restructuring, only the solar water preheater project remained with a GEF funding of US$0.2 million. The remaining GEF funds for Component A of US$3.1 million were cancelled.

Component B: Core Support Activities

(a) Information Dissemination and Marketing – There were no changes to specific activities in this subcomponent.

(b) EE Financial Facility and Portfolio Building – The component remained but with a reduced financing level after the 2003 restructuring. At the time, the Brazilian Capital Market Institute (the Instituto Brasileiro de Mercados de Capitais, or IBMEC), in partnership with other institutions, including the Brazilian ESCO association (ABESCO), started to develop a facility along the same lines as that envisioned under the GEF project. However, the problems in the ESCO business in Brazil were multi-faceted and profound as described in the introduction section, and it therefore required more time and resources to solve than this project could provide. It was therefore agreed with the Government at the time of restructuring that the resources allocated for this subcomponent could be better used to strengthen the Testing, Certification and Labeling Program and that the results could be achieved in shorter time period. Therefore, this subcomponent was cancelled.

(c) Testing, Certification and Labeling Program – this subcomponent was given greater emphasis during the restructuring to reflect and build upon new consumer awareness towards EE. The laboratory capacity program was strengthened.

In addition, with the introduction of the Law on Energy Efficiency (LEE) in October 2001 (Law No. 10.295/2001), this program was also used to support the implementation of this new legislation. The law would establish the maximum level of consumption and the minimum levels of EE for equipment and consumer appliances commercialized in Brazil. A consortium of consultants in April 2004 was hired to elaborate the priorities and methodologies for establishing the EE guidelines and standards for appliances, buildings and equipment and to evaluate the laboratory capacity for testing, investment needs, and the impacts of the implementation of the LEE. However, by September 2005, the consortium had made very little progress and the quality of the technical reports delivered by them was of poor quality. Thus the consultant contract for the work was terminated prematurely. The Ministry of Mines and Energy continued the work with its own funding.

(d) Marketing Assessment Program – No changes to specific activities.

Component C: Capacity Building Module

(a) Training and Education – As the ESCO support program was cancelled under Component B, the training for ESCOs and individuals and companies considering entering the ESCO business was modified accordingly. The project restructuring included the preparation and publication of best practice case studies, business and technical guides, relevant to EE in Brazil, and in accordance with other projects, to the market assessment and to the LEE. In order to disseminate EE practices throughout the country, this subcomponent included support for a video-conferencing system.

(b) Support to Federal and State Energy Agencies and Regulatory Organizations – this activity was cancelled at the restructuring. Capacity building resources for these agencies and regulators are envisaged in another Bank project – the ESTAL (Energy Sector Reform Technical Assistance Loan – Project ID: P076977).

(c) Support to Project Management, Evaluation and Information Systems – this activity was kept mostly unaltered; however, the project subcomponent that was intended to contribute to the synergies between the ESCOs and other industry players was cancelled.

6.7 Other significant changes
(in design, scope and scale, implementation arrangements and schedule, and funding allocations)

Other significant changes included the funding level of the GEF grant and the implementation timetable of the project. The GEF funding was reduced from US$15 million to US$11.9 million and US$3.1 million was cancelled. The project was approved in September 1999 and was originally scheduled to become effective in January 2000. The GEF Grant agreement was signed in December 2000 and the project actually became effective in February 2001. Downsizing at Eletrobrás delayed compliance with two key effectiveness conditions -- staffing the Project Management Unit (PMU) and signing two subsidiary agreements with project participants in demonstration projects.

The project closing date was extended from the original December 31, 2003 to December 31, 2004 during the 2003 restructuring due to lack of progress in implementation. It was then extended to December 31, 2005 and finally to June 30, 2006. When the project was restructured in 2003, the disbursement rate was very low. The PMU's staffing capacity improved somewhat, but there had been no proven record in the success of the PMU in project implementation. In this regard, the Bank team decided to take a cautious approach by granting only a one-year extension to give the PMU a chance to perform. Upon satisfactory progress in the first year after project restructuring, another year of extension followed. The final extension was granted to complete the procurement and disbursement of key elements of the restructured components.

7. Key Factors Affecting Implementation and Outcomes
7.1 Project Preparation, Design and Quality at Entry

identified, and adequacy of participatory processes, as applicable)

Eletrobrás, sponsor of PROCEL, first sought the Bank's support to establish a self sustaining market for energy efficiency in Brazil in 1995. The project preparation started in 1997 when Brazil was in the middle of moving toward cost-based energy pricing and the government was promoting efficient use of energy, particularly electricity, at a time of increasing risks of supply shortage. The government's pro-energy efficiency policies (as evidenced by the strong PROCEL program and other EE initiatives), in combination with a relatively stable economy and rising energy prices, provided the basis for seeking to overcome other barriers to increased EE.

The factors affecting project preparation and design and quality at entry include:

(a) The project fully supported the government's energy sector priorities, sector-related CAS objectives and GEF Operational Strategy in improving energy efficiency and protecting the global environment. The 1998 CAS progress report indicated that one of the Government's energy sector aims was to support programs and technologies for efficient supply and use of energy. The project was designed to address this by demonstrating and making available a broader set of effective and environmentally sound EE measures than those currently available to energy suppliers, users, and service providers.

(b) To remove the barriers for the efficient use of energy, the project chose a market-based approach rather than a "command and control" approach. The market-based approach was designed to take place in two phases: first to demonstrate cost-effective measures in selected utilities and different end-use sectors, to develop a standards and labeling program and set up a market-based support structure for ESCOs, and then to disseminate the best practices and expand the ESCOs to all sub-sectors. It was expected that at the end of the program, there would be a number of participants with demonstrated success in emerging technologies, use of price signals (e.g., time of day tariffs) and service options, etc. and increased use of more efficient appliances and energy equipment.

(c) The project considered a range of alternatives, but they were rejected for justifiable reasons. One alternative rejected was to continue meeting energy needs solely through the expansion of the energy supply system. Investment needs in the power sector for this alternative were estimated at US$6-7 billion per year, which would have been difficult to mobilize. The alternative of a simple credit line to support EE investments was discarded because similar initiatives in Brazil and other countries had failed in addressing market barriers. The alternative of a single long-term investment operation was rejected because the success of the EE program requires the participation and support of many organizations and progressive, flexible mobilization arrangements for which an APL was more suitable.

(d) The project design incorporated lessons learned from similar EE projects in both Brazil and other countries by the Bank and other development agencies as well as from other recent energy projects in Brazil. The lessons learned and incorporated in project design included: (1) working in parallel, but separately, on macroeconomic/sectoral and project issues, as in the past ineffective financial rehabilitation undermined the credibility of the financial covenants; (2) an enabling environment was needed for any changes to electric

tariff levels and was provided by the current sector privatization and restructuring; (3) taking into account the trade-off between good implementation by the stronger companies in the well-developed regions and the greater needs on the part of the poorer companies in other regions by including participants from geographical areas of different development levels; (4) pricing and regulatory reforms were necessary for implementing the DSM measures as shown by projects in Thailand, Mexico and Jamaica. Help from experts working on PROCEL and DSM programs in other countries was used in the project design; and (5) the expansion of EE activities in Brazil, as shown elsewhere, entails a learning process requiring the participation of different actors that receive the correct market and regulatory signals over a period of time to prepare them for mainstreaming energy efficiency measures.

(e) A number of potential project risks were stated in the PAD, and measures were developed for their mitigation. However, several risks that eventually materialized were listed as negligible or were not listed at all. The risk of "the lack of interest in demonstration projects" by utilities was listed as "negligible". However, even before the energy crisis of 2001-2002, the interest of utilities in demand-side energy efficiency investments was limited, and it took one year for Eletrobrás to sign the required two subsidiary agreements for project effectiveness. This lack of interest was exacerbated by the energy crisis. Two other risks that were not considered significant in the PAD were high interest rates and their affect on EE investments by utilities or consumers directly or through ESCOs, and fluctuations in exchange rates between Real and US dollar which also affected the utilities' decision-making and ultimately contributed to the cancellation of the World Bank loan. The energy crisis did not cause the upheaval in Brazil's credit and foreign exchange markets -- high interest rates and currency risk already existed at the time the of the project's inception.

7.2 Implementation
(including any project changes/restructuring, mid-term review, Project at Risk status, and actions taken, as applicable)

The main project changes/restructuring has been discussed in Section 6.6 above. The other key factors affecting implementation and outcomes were the following:

The positive factors affecting project implementation include:

(a) The Energy Efficiency Law No. 10.295/2001 was enacted in 2001. The Law stipulates that the government determines the maximum level of energy consumption and the minimum requirement for energy efficiency for commercial equipment. This regulatory structure has been essential for widely disseminating the domestic and international best practices by the project.

(b) The project restructuring was approved in 2003 in response to the lack of progress in the first two years of project implementation. The restructuring reinforced the components of information dissemination and testing, certification and labeling to capitalize on the higher level of public awareness on energy efficiency measures after the 2001/2002 energy crisis.

(c) An effectively functioning PMU after project restructuring ensured project completion, with most of the project disbursements taking place in the last two years of the project. Credit is due to the support of Eletrobrás leadership during this time, the dedication and qualification of the incumbent project coordinator and team members, as well as the UNDP-Brazil office which provided technical advisory services on procurement.

The project was negatively affected by the following factors during implementation:

(a) High interest rates in Brazil. With the nominal interest rate having never been lower than 16 percent per year during the project life, and with loans to energy efficiency developers typically costing well above 20 percent interest, it has been difficult for ESCOs to undertake EE projects and to convince commercial banks to lend money even for highly profitable projects.

(b) Eletrobrás' higher-level management changed several times during the project life. At the start of the project, upper management in Eletrobrás did not adequately delegate decision-making to the PMU, and Eletrobrás as a whole was constrained by lack of knowledge of Bank procedures, causing serious delays in implementation. Some key staff members who championed the preparation of this project left the company before project effectiveness which affected the process and support for some demonstration projects.

(c) The procurement approach used in the early years of implementation -- lumping various lots of specialized research equipment in several International Competitive Bids (ICBs) -- yielded very poor competition. In fact there was only one bidder for most of the bids. An inadequate number of equipment suppliers responded to the solicitation of proposals for certain types of lab equipment, resulting in the delay in procurement of testing and certification equipment. Upon identifying this problem in 2004, the Bank team recommended a different approach for procurement of specialized equipment, beginning with a large advertisement for all equipment remaining to be procured, and then grouping the equipment into different procurement packages according to the response of business markets. This new approach proved successful: it attracted the manufacturers themselves, not resellers, with competitive prices.

The project risk was rated substantial in the first Project Status Reports (PSR) in March 2000 and changed to modest in July 2000 after the implementing agency Eletrobrás took actions to meet the effectiveness conditions, including setting-up the Project Management Unit (PMU) and seeking to sign subsidiary agreements with project participants. The project risk was elevated from modest to high in May 2003 as a result of the implementation delays, brought on by a change in the Administration within Eletrobrás and this rating remained until August 23, 2004.

7.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

The PAD included key performance indicators, targets at the end of the project, and the methods to monitor and evaluate to ensure the realization of project objectives and

outcomes. The indicators are relevant and adequate to measure the performance of the project, including the energy savings and climate change benefits of the project.

The independent market performance evaluations and PROCEL reports were to help gauge the extent to which the targets for some key indicators such as energy savings and CO_2 emission reduction were achieved under the project. The initial market survey has been completed for low-voltage consumers (residential, commercial, and some light industrial) and shows that the impact of the GEF support on EE market development appears to be large. Refrigerators are a notable example of early success with the standards and labeling program, where 100 percent of the refrigerators in the market are labeled with energy efficiency ratings, 40 percent of the all refrigerator models in Brazil have received PROCEL seals, and 55 percent of the refrigerators sold in the market in Brazil are PROCEL-sealed. As the World Bank will continue to be involved with energy efficiency in Brazil, this information, when completed, will be useful for identifying the remaining issues and needs in energy efficiency and provide a solid information base for future interventions.

The project procurement records and the Bank's disbursement data are well maintained and archived. The disbursement and procurement information has been used for evaluating the implementation progress and project completion.

7.4 Safeguard and Fiduciary Compliance
(focusing on issues and their resolution, as applicable)

The project was rated Category C for environmental assessment. No adverse environmental effects have been reported as a result of the project as the majority of the project activities consists of low-impact items such as training, purchase of equipment, marketing, information dissemination, and empirical studies.

7.5 Post-completion Operation/Next Phase
(including transition arrangement to post-completion operation of investments financed by present operation, Operation & Maintenance arrangements, sustaining reforms and institutional capacity, and next phase/follow-up operation, if applicable)

The market-based approach to promoting EE measures in Brazil will be sustained through the following.

First, the EE information center will continue be maintained by the PROCEL program after the project. The information center serves as a one-stop shop for compilation and dissemination of the EE-related information. It has set up and operated an Internet portal for this purpose. It will receive budgetary support by the Government under PROCEL to maintain and disseminate the information that has been collected and compiled under the GEF project.

Second, the strengthened laboratory capacity in testing and certification of EE products will remain in place with the growing demand by the product manufacturers and suppliers. The laboratories which received GEF support entered into an agreement with

ELETROBRÁS/PROCEL for the right to use the equipment for the first five years. A service flow is to be agreed during this period; otherwise, ELETROBRÁS/PROCEL will take back the equipment and will solicit other hosting institutes. ELETROBRÁS/PROCEL monitor the usage of the equipment of different labs on a six-month basis. The hosting laboratories will own the equipment after five years and the operation and maintenance costs will be covered by a service charge. Initial evidence showed that the service charge is sufficient to provide a reliable source of revenue for the labeling program. Given the heightened public awareness of energy efficiency and increased demand of EE products, the demand for EE testing and certification has been increasing and is expected to continue to grow in the future as the impact of the PROCEL program further unfolds. Therefore, these testing labs are expected to be self-sustaining as service providers.

8. Assessment of Outcomes

The project incorporated the global environmental objective to reduce greenhouse gas emissions by helping remove barriers to the increase in energy efficiency. The achievement of the objective is measured by energy savings, reduction in CO_2 emissions and postponement in investment in electricity supply. The target values of these key permanence indicators were set to be achieved by the end of the EE program, 10 years after project approval in 1999.

According to ANEEL, the distribution companies have invested on average US$100 million per year on EE projects since 1999 with partial funding from the wire-charge and other programs, resulting in energy savings of 5,218 GWh over the 7-year period or 0.2 percent of the country's total consumption. This is equivalent to a reduction of 4.8 million tons CO_2 emissions. The PROCEL program, which received the GEF grant for strengthening and expanding its operations, yielded energy savings of 13.3 TWh from 1999 to 2005, which corresponded to 12 million tons of CO_2. The postponed investment in 2005 was estimated at around US$790 million. What portion of these benefits achieved by PROCEL can be attributed to the GEF funding is a difficult question for two reasons. First, GEF funding was used to complement PROCEL's own budget for continuing operations of its activities and is therefore almost impossible to separate the impacts of the two. Second, the activities which received GEF support tend to have long-lasting impacts far beyond the project life, and at the moment it is premature to gauge their full impact on energy efficiency. As a rough estimate, we can assume the GEF funding has the same per-dollar level of impact as the PROCEL funding. The GEF funding is equivalent to the annual average of the PROCEL funding between 1999-2005; thus the benefits brought about by GEF would be equivalent to the annual averages of the total benefits of the PROCEL between 1999-2005, i.e. 2 TWh of energy savings and 1.7 million tons of CO_2 emission reduction. In addition, there was evidence of significant leveraging effect of the GEF funding on EE investments in Brazil. Most of the GEF funding of US$11.9 million was disbursed in 2004 and 2005 (see Annex 3(c) of project disbursement profile). Over the same period, the total approved investments by PROCEL increased from US$20 million in 2002-3 to more than US$45 million in 2004-5 based on available PROCEL data.

Critical to the final outcome on energy savings and the effectiveness of Procel and GEF funding is the effect of the energy supply crisis and power rationing on consumer behavior and EE awareness. According to the preliminary results of the market survey, *some* EE measures adopted by the consumer – such as the use of compact-fluorescent light bulbs – were permanent. The energy supply crisis partly circumvented the role of the project by demonstrating EE measures and their savings potential. The crisis also had a negative impact on the finances of electricity distribution companies which reduced their interest in improving energy efficiency for other than loss reduction.

The project's accomplishments have been significant in facilitating the removal of market barriers to EE and energy conservation in Brazil. The first barrier was lack of public awareness of energy efficiency potential. The GEF-funded activities helped establish an EE information center to disseminate information on EE products, services and delivery mechanisms, delivering a marketing strategy and action plan and a public marketing campaign, and increasing consumer awareness of the PROCEL seal. The information center is operational as a pilot and includes (i) an internet portal; (ii) a SAC (Serviço de

Atendimento ao Cidadão, i.e. a Service Center) to answer calls, questions and information requests from citizens; (iii) an Operation and Development Group (trained staff to operate and maintain the portal and SAC); and (iv) a Consultative Board (supervision and definition of guidelines and policies for the center). Through the acquisition and installation of testing equipment, the project helped establish 23 specialized laboratories around the country for testing and certifying the efficiency of equipment and appliances. Following the marketing campaign supported under the project, the recognition of the PROCEL seal was increased from 35 to 45 percent.

A second barrier was the lack of credible information on effective EE measures. The project addressed this problem through the development of best practice manuals and technical guidebooks, by conducting research on the EE potential and the market in the industrial, commercial, residential and public sectors, and by implementing a comprehensive training program. The training had 2,650 participants in total and delivered 86 courses in 12 cities covering different geographical areas. One technical guide, four practical manuals, four books, and six case studies were published.

The third barrier was the lack of supporting mechanisms. The project was designed to address this by implementing a financial facility to support EE measures by ESCOs, including building a portfolio of EE projects and preparing them for commercial financing by third parties. The envisioned facility would develop and disseminate commercial and financial instruments for these purposes. ESCOs in Brazil have been developing, albeit slowly, in spite of the cancellation of the Financial Facility component under the project. Banks and other financial agents are beginning to understand more about the special characteristics of the ESCO business and of EE project financing. BNDES, the national development bank, has established a pilot credit guarantee facility called PROESCO in mid-2006 after years. The PROESCO mechanism is similar to what the project was envisioned to support. Nonetheless, the market environment for ESCO-related activities has remained difficult (high interest rates, small ESCOs with limited credit, lack of commercial bank interest), and the cancellation of the ESCO support program under the GEF project reflected these larger market problems. The project could have contributed further towards the accomplishment of its objectives had it managed to advance on the component of EE financing facility and portfolio building.

8.3 Efficiency

(Net Present Value/Economic Rate of Return, cost effectiveness, e.g., unit rate norms, least cost, and comparisons; and Financial Rate of Return)

Not applicable.

8.4 Justification of Overall Outcome Rating

(combining relevance, achievement of GEOs, and efficiency)

Rating: Moderately Satisfactory

In Brazil, as in most developing countries, there is a large potential for increasing the

efficiency in the use of energy in all its forms. Achieving even a fraction of the potential energy savings could bring substantial economic, social and environmental benefits for society. Considering only electricity, the potential in Brazil is estimated to be around R$5 billion per year (US$2.3 billion). These savings would also be associated with reductions with CO_2 emissions. Considering that annual CO_2 emissions from thermal generation are expected to grow substantially in Brazil, increasing EE is especially important. More importantly, energy savings are expected to benefit consumers. The PROCEL program has certainly had an important impact on improving the efficiency of energy use in Brazil, and the GEF project helped accelerate and focus PROCEL in key areas, namely a national standards and labeling program, improved information, and training and dissemination. Exactly how much of the energy savings achieved under PROCEL during project implementation can be attributed to the GEF project is uncertain, but can be related to the effectiveness of those parts of the PROCEL program that received GEF support. Another uncertainty relates to how much of the energy savings and conservation achieved by PROCEL can be considered permanent. Probably the most important source of gains has been the consolidation of the labeling, testing and voluntary certification program (through the PROCEL seal).

8.5 Overarching Themes, Other Outcomes and Impacts
(if any, where not previously covered or to amplify discussion above)

(a) Poverty Impacts, Gender Aspects, and Social Development

The project has had a positive net social impact. Even without factoring in the indirect benefit on consumers from overall energy savings, consumers have benefited from the improved labeling and certification, as well as from more available EE information. In addition, a pilot project installed solar water pre-heaters, benefiting directly low-income households in the municipality of Americana (São Paulo).

(b) Institutional Change/Strengthening
(particularly with reference to impacts on longer-term capacity and institutional development)

The project has had both direct and indirect institutional benefits for PROCEL, some of which are likely to be permanent. Information platforms, a system of labels and standards, and the training of staff for these and other energy efficiency activities have been put in place within PROCEL and its associated laboratories. Notwithstanding the initial project staffing and implementation difficulties, it appears that a cohort of additional quality staff have been put in place in PROCEL through the project. The maintenance of this institutional capacity will depend in part on management decisions by the Government and Eletrobrás for PROCEL.

(c) Other Unintended Outcomes and Impacts (positive or negative, if any)

8.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops
(optional for Core ICR, required for ILI, details in annexes)

This is a core ICR, for which no beneficiary survey or stakeholder workshops were

conducted.

9. Assessment of Risk to Global Environment Outcome

Rating: Moderate

The global environment outcome of the project is that greenhouse gas emissions from the electricity sector in Brazil are reduced through the reduction in electricity consumption as a result of adoption of energy efficiency measures. The adoption of energy efficiency measures was achieved by providing better public access to energy efficiency-related information, conducting marketing campaigns for energy efficiency products, implementing the testing, certification and labeling program for energy efficient products, training professionals and the public on energy efficiency measures and policy, and disseminating energy efficiency practices.

The risk that the project's global environment outcome will not be sustained is judged as moderate for the following reasons. First, the enhanced public awareness in energy efficiency is likely to continue into the future and not disappear when the project closes. Second, since many energy efficient electric appliances such as refrigerators and TV sets have a lifetime of more than 10 years, the increased purchase of these appliances as shown in the preliminary market assessment will have a lasting effect beyond the project life. Third, the testing and certification of equipment funded by the project are expected to continue. CEPEL will own the equipment and will enter into contractual agreements with the hosting labs in terms of the right of use. CEPEL monitors the usage of the equipment bi-annually upon which CEPEL will determine whether to maintain the agreements. The hosting labs are expected to cover the operating and maintenance costs through service charges to energy efficient appliance manufacturers.

Moderate risk exists with regards to the EE Information Dissemination Center. It is housed in the PROCEL program in Eletrobrás and its operation largely depends on the funding availability for PROCEL. Although PROCEL's funding has declined since 1997, the total energy efficiency investments have been on the rise (see G. Jannuzzi, 2005. Power sector reforms in Brazil and its impacts on energy efficiency and research and development activities, Energy Policy, Vol.33, pp 1753-1762.) Given the profile of PROCEL, that was heightened by the crisis and the GEF project, it is probable that the government and Eletrobrás will continue funding the program.

10. Assessment of Bank and Borrower Performance

The project was consistent with the government's energy sector strategy and the Bank's Country Assistance Strategy. The project built on the national EE program (PROCEL) which had already carried out and overseen hundreds of EE projects and had achieved significant benefits in electric energy savings. The project activities with the GEF grant essentially aimed to expand PROCEL activities in standards and labeling, training, marketing, communication and the further development of ESCOs.

The Bank team identified shortcomings in institutional arrangements and managerial and technical capacity within Eletrobrás as high risk in the project preparation stage. Nonetheless, the choice of Eletrobrás as the implementing agency had clear advantages: (1) Eletrobrás would take advantage of its structure already in place for executing PROCEL; (2) Eletrobrás would continue to use its Physical-Financial Information System introduced in 1996, which provides adequate monitoring of the activities. The measures proposed to minimize this risk--creation of a project management unit (PMU) and implementation of the capacity building component targeting the PMU—were proven effective in other Bank projects. Sufficient GEF funding was allocated for project management. However, the departure of some key staff in Eletrobrás and constant changes in Eletrobrás' management contributed to the delay in effectiveness and implementation.

In hindsight the Bank was probably overly optimistic with respect to the demonstration projects. The incentives that the distribution companies had with respect to energy efficiency were limited to utilities facing near-term supply constraints, where energy efficiency was the least-cost and fastest option, to loss reduction (such as with non-paying customers), and to load management measures whereby consumers could be shifted away from high-cost peak power and in the process save on peak power capacity and generation. While the energy crisis was not foreseen, the weakness in demand for energy efficiency by utilities could have been better anticipated, and at least flagged as a potential risk. In addition, there were no time schedules for achieving the performance indicators.

(b) Quality of Supervision

(including of fiduciary and safeguards policies)

Rating: Satisfactory

The project, over its course, saw the departure of numerous key staff and multiple changes in project leadership within Eletrobrás, the occurrence of the energy crisis in 2001/2002, and the change of government in 2003. Despite the delay in project implementation and the cancellation of the loan components, the Bank team worked with its counterparts in a consultative and open-minded manner for solutions to ensuring that the project be adapted to the new circumstances so that the project objectives could be met. The Bank team closely monitored the 2001-02 energy crisis and was engaged with different stakeholders to discuss the national EE emergency measures during power rationing and the implications for this GEF project. Eventually it was agreed that the GEF funding was still relevant and should proceed (at a slightly reduced level) and that some of the original project activities should be adjusted to reflect the new circumstances. Two to three missions were typically undertaken every year and PSRs/ISRs and Aide Memoirs were produced. The Bank team

diagnosed the implementation capacity constraints in the PMU early in the implementation stage and communicated it explicitly to the Government and to Eletrobrás. The project closing date was extended three times for a total of two and a half years to allow the project to be completed. The implementation progress ratings were reported "unsatisfactory" for only May 2002-May 2003, whereas there had been no implementation activities under the project between February 2001 and May 2002.

(c) Justification of Rating for Overall Bank Performance

Rating: Moderately Satisfactory

Although there were problems at entry, including with the design of the demonstration projects, once restructured by the Bank, the project performed satisfactorily. Given that the Bank performance ratings for supervision were satisfactory, and that this remained over the following four years of implementation, the overall Bank performance is moderately satisfactory.

10.2 Borrower

(a) Government Performance

Rating: Moderately Satisfactory

The Government's performance is considered moderately satisfactory. The national energy conservation program, housed at Eletrobrás, had achieved significant benefits in energy savings, development and commercialization of various new technologies and avoiding adverse environmental impacts resulting from use of fossil fuels by 1995. Valuable lessons had been learned from the first 10 plus years of PROCEL implementation. The government was motivated to expand the PROCEL using the Bank and GEF funding along with other resources, to capitalize on the achievements made in the first phase of the program. However, as with other projects in Brazil, there was a delay in the approval of the GEF project by the government by more than one year.

The Government of Brazil instructed the implementing agency to meet the conditions for effectiveness before signing any contracts involving Bank/GEF funding. Effectiveness conditions were that: (a) the PMU in Eletrobrás was set up and operating; and (b) at least two subsidiary agreements were signed with project participants and the respective Project Implementation Units are set up and operating. Meeting these conditions helped the project to be launched with some confidence. In addition, the 2001-02 energy crisis, while undesirable, created some incentives for implementing EE measures as consumers were effectively required to reduce electricity consumption by 20 percent. The focus by the government on the energy crisis naturally drew attention and resources away from the GEF project. However, the EE measures adopted by the government in its Energy Conservation Strategic Emergency Program were also included in this project. The public procurement process in Brazil hindered progress on the project and ultimately led to the hiring of UNDP as the procurement agent.

(b) Implementing Agency or Agencies Performance

Rating: Moderately Satisfactory

Implementing Agency	Performance
Centrais Eletricas Brasileiras S/A	The performance of the Implementing Agency Eletrobrás is rated moderately satisfactory and there was significant variation over time. The PMU in the last two years of project implementation was equipped with committed and qualified PMU staff that performed admirably. The PMU staff at Eletrobrás showed willingness to learn and get things done right even though sometimes it involved the restructuring/reissuing of the procurement packages. Project procurement was greatly helped by hiring UNDP as procurement agent to compensate the inexperience of Eletrobrás in Bank procurement procedures and preempt Eletrobrás's complicated bureaucracy. Subcontracting the UNDP expertise in procurement was overall a wise decision made by Eletrobrás. Not only was the procurement process sped up, but also it was an on-the-job training for the PMU staff. Eletrobrás even placed a full-time staff member in the UNDP-Brazil office to speed up the procurement process. However, at the beginning of project implementation, the staffing of the PMU was insufficient to implement the project as planned. The decision process in Eletrobrás and the allocation of approval responsibilities did not allow for making decisions in a timely manner. Between 2000 and 2003, the Bank Supervision reports continuously rated institutional arrangements and managerial and technical capacity as "high risk." Not until December 2003 was this risk factor downgraded from high to modest. Until then, Eletrobrás failed to take prompt corrective measures in a timely fashion that were agreed with the Bank. In addition, personnel changes in Eletrobrás affected negatively staffing the PMU in a timely manner which was one of the effectiveness conditions.

(c) Justification of Rating for Overall Borrower Performance

Rating: Moderately Satisfactory

Since all of the performance ratings above are moderately satisfactory the overall Borrower's performance rating is moderately satisfactory.

11. Lessons Learned
(both project-specific and of wide general application)

There are several main lessons from the project that should be used in subsequent GEF and World Bank energy efficiency projects.

(1) Demand-side management (DSM) programs can be successful only if the underlying

incentives of the regulatory framework are in place and correct. Electricity utilities will not have an automatic incentive to invest in energy efficiency measures – although they may have incentives to shift demand or to delay investments in new capacity, also depending on the regulatory framework – because this will lower their sales and revenues. Consumers, on the other hand, do have an incentive to improve energy efficiency, but often lack sufficient information on specific cost-effective measures and the means to finance investments. For these reasons, standards and labeling programs like the one supported by this project can be very important for improving energy efficiency by setting minimum efficiency standards for energy-consuming equipment. By the same token, providing better information to energy consumers can help them make more informed choices about their energy consumption. The project improved the information for consumers about the benefits of energy efficiency, and through the standards program -- that was applied to selected appliances -- reduced the energy consumption of specific equipment relative to what would have been the case otherwise.

(2) The rationing program that was put in place in 2002 to deal with severe cuts in electricity supply was effective in reducing consumption, but also resulted in large financial losses to the distribution utilities that have been being made up through utility bills since the crisis. Throughout the crisis, utilities in Brazil had some incentive to reduce their losses -- from non-payment and theft -- through energy efficiency measures, such as improved street lighting from non-paying municipalities and improved lighting and energy efficiency appliances in poor residential neighborhoods. Other energy efficiency measures -- among paying customers -- was much more limited since it reduced utility revenue, and during the rationing program, demand was being reduced largely without investment in permanent energy efficiency measures.

(3) The rate of return on many energy efficiency projects will be reduced where interest rates for credit are high, as has been the case in Brazil for the past fifteen years. While many EE projects can have rates of return of 25 percent or more, when interest rates are 15-20 percent or more, banks will look for projects with much higher rates of return or will put their money in investments with limited or no risk, such as government debt in the case of Brazil Future operations should be realistic in their expectations when trying to establish an ESCO industry when the underlying financial conditions are weak.

(4) Development of an energy efficiency industry -- including true Energy Service Companies that enter into shared-savings or performance contracts and provide financing for energy efficiency investments -- takes time and a conducive regulatory and financial environment. When ESCOs are small and undercapitalized companies, as is the case in Brazil, they will not be able to finance EE investments on their own balance sheets and usually cannot obtain sufficient credit from commercial banks. Future operations may have more success by identifying specific barriers in specific subsectors that can be overcome through discrete actions.

(5) The post-procurement audit identified weaknesses in the procurement process for the project that was handled by UNDP. Some deals were unable to conclude because UNDP could not issue letters of credit. As mentioned earlier, the PMU also learned how to package procurement bids in a way to attract more bidders and this was used effectively in the

project.

(6) Project indicators should be flexible and be adapted during implementation as conditions change and the project develops. Some of the indicators that were designed at the project concept stage became irrelevant later and the target values became unrealistic. In addition, the target values for some of the key indicators were set for the entire EE program which was envisioned to be implemented in two phases, and there were no intermediate values for Phase I which the project was set to be. As a result, it is difficult to evaluate the project achievements and impacts by measuring the outcomes against the target values which are essentially non-existent.

(7) The new ICR template is problematic. The structure of the sections is disorganized making it difficult to read and get an overall concept of project implementation. This was made clear by reviewers at the ICR meeting.

12. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/implementing agencies

(b) Cofinanciers

(c) Other partners and stakeholders

(e.g. NGOs/private sector/civil society)

Annex 1. Results Framework Analysis

Global Environment Objectives

This project was designed to support an Energy Efficiency Program in Brazil. The global environmental objective of the project was to reduce greenhouse gas emissions by increasing the efficiency of energy supply and use in Brazil using a market-based approach. The project objective was fully consistent with GEF Operational Program No. 5, namely the removal of barriers to EE and energy conservation. The objective of OP5 is the dissemination of least-economic cost energy-efficient technologies and the promotion of the efficient use of energy. The EE program would reduce the risk of climate change by mitigating greenhouse gas (GHG) emissions, which would help Brazil to meet its commitments under the United Nations Framework Convention on Climate Change through intensified national efforts to improve energy efficiency in various sectors.

The key indicators, as set out in the PAD, include: (1) reduction of CO_2 emissions (19.2 million tons in a 10-year period); (3) energy savings of 20.8 TWh over a 10-year period (PAD Annex 4 of Project Justification); and (4) postponement of investments in electricity supply (US$300 million per year) over a 10-year period. It is worth noting that the target values for these indicators were set to be achieved in two phases over 10 years, but the project being evaluated only covers Phase I for which no intermediate target values for these key indicators are available.

Revised Global Environment Objectives

There was no change to the project GEO of increasing energy efficiency in Brazil even though the project was restructured in 2003 (see Section 6.6 on the changes as a result of the restructuring). The three key indicators remain relevant although their target values cover a much longer period than the project life. The project output indicators, as approved in project restructuring, are shown in Table 2.

Table 2 Project output indicators as approved in the 2003 project restructuring

	Project Output	Key Indicators	Revised Baseline at the time of restructuring	Target	Actual Achievement
COMPONENT A	Completion of the EE activities funded by IBRD and GEF	Number of Solar Water Pre-heating Equipments by CPFL	0	210	210
	Organization and programs exist to make credible information available on new EE products, services and delivery mechanisms.	Energy Efficiency Reference Center is fully operational.	0 percent	100 percent	100 percent
		Status of the Marketing plan	0 percent	100 percent	100 percent
		Status of the Publicity Campaign	0 percent	100 percent	100 percent

	EE Financial Facility is established, operated by a qualified financial entity and demonstrated ability to assess, appraise and find necessary funding of qualified EE market-based subprojects based on agreed operational practices and eligibility criteria.	Number of financial facility projects developed	0	15	0 (this component was cancelled later)
	The market for EE products and services is working better through improved information and market procedures, with a system to evaluate global market performance. In order to reach this goal, the CEPEL laboratory is fully operative.	Goniophotometer is fully operative (structure of CEPEL/RJ Laboratory)	0 percent	100 percent	100 percent
		Solar Heating systems laboratory tester is fully operative (PUC/MG Laboratory)	0 percent	100 percent	100 percent
		Hydraulic systems laboratory tests is fully operative (EFEI/MG Laboratory)	0 percent	100 percent	100 percent
		Definition of EE Standards to comply the Energy Efficiency law	0 percent	100 percent	0 (this component was cancelled later)
	Research on the industrial, commercial, residential and public sectors with the aim of updating the information about the acceptance of the efficient equipments by the market has been completed.	Research on Industrial sector is done	0 percent	100 percent	100 percent
		Research on Commercial sector is done	0 percent	100 percent	100 percent
		Research on Residential sector is done	0 percent	100 percent	100 percent
		Research on Public sector is done	0 percent	100 percent	100 percent
COMPONENT C	An enhanced program management unit exists with capability to learn by doing and adapt the EE program based on evaluation of market performance of EE activities and participants. Moreover, strategically people linked to the Brazilian educational system are capable to understand and promote the Energy Efficiency Program.	Number of people that received technical training	0	1800	2650
		Number of courses developed to Undergraduate and Graduate levels.	0	6	86 (covering 18 subjects)
		Number of Technical Guides published	0	2	5 (1 technical guide and 4 technical books)
		Number of Best Practice Cases Published	0	10	10 (4 specialized manuals and 6 best practice cases)
		Video conference facility is fully operative	0 percent	100 percent	100 percent
		Enhancement of Program Monitoring and information system, project management unit is fully established and counterpart staff is selected.	0 percent	100 percent	100 percent

(a) GEO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval	Formally Revised Target	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Reduction of CO_2 emissions (21 million tons of CO_2 per year).			
Indicator 5 :	**Indicators correspond to 10-year period. Completion is estimated for Dec 2009 but system limitations do not allow post-dating Target Date.**			
Value (quantitative or	No concern about CO_2 emissions	Reduction of CO_2 emissions (21 million		EE measures implemented by PROCEL (the most important one electrical equipments labeling) represent an average energy savings
Value (quantitative or	5 types of products tested, labeled and	12 types of products tested, labeled and		13 types of products have been tested, labeled and certified
Date achieved	09/30/1999	06/30/2006		06/30/2006
Comments (incl. % achievement)	Based on Regulatory Agency (ANEEL) requirements, since 1999 distribution utilities are investing approx. US$100 million per year in EE projects. Over 7 year period estimates the energy saved total 12 TWh & CO_2 emissions avoided total 48 million tons.			
Indicator 2 :	Energy Savings (1 percent per year).			
Indicator 6 :	**Indicators correspond to 10-year period. Completion is estimated for Dec 2009 but system limitations do not allow post-dating Original Target Date. Current ICR covers Phase I.**			
Value (quantitative or	EE measures result in 0.6% of country total	Energy saving 1% per year)		Energy savings from PROCEL average 0.6% of annual energy consumption.
Value (quantitative or	Minimal PROCEL's brand	30% of PROCEL's brand	n/a	45% of PROCEL's brand recognition
Date achieved	09/30/1999	06/30/2006	06/30/2006	06/30/2006
Comments (incl. % achievement)	According to ANEEL, energy savings from EE investments by distribution utilities is around 0.2% of country's annual consumption in 2005. After that a new consumer survey was carried out. Its results showed a positive impact on electricity consumption.	A campaign was aired on TV until December 2005.		Campaign was aired on TV until December 2005. After that a new consumer survey was carried out. Its results showed a positive impact on electricity consumption about PROCEL and the recognition of the "PROCEL Seal" for efficient equipment.
Indicator 3 :	Postponement of investments in electricity supply (US$300 million per year).			
Indicator 7 :	Increased number and type of EE products and services are available			
	Indicators correspond to 10-year period. Completion is estimated for Dec 2009 but system limitations do not allow post-dating Original Target Date. Current ICR covers Phase I.			
Value (quantitative or	Postponement of investments in 1999 around US$580	Postponement of investments in electricity supply		Postponement of investments resulting from PROCEL was around US$760 million in 2005
Value (quantitative or	EE labeling available for some products.	10% of equipment sales are Class A.		Data is not available as most of the project activities were implemented in the last two years and the PROCEL is conducting a new market survey, the results of which will be available early next year.
Date achieved	09/30/1999	06/30/2006		06/30/2006
Comments (incl. % achievement)	The annual postponement investment increased by US$105 million from 1999 to 2005, based on the uniform exchange rate US$1.00 = R$ 2.10 for all years.			
Indicator 4 :	Best Practice cases are completed: 15 cases per year in the last year of the two-phase program.			
	Indicators correspond to 10-year period. Completion is estimated for Dec 2009 but system limitations do not allow post-dating Original Target Date. Current ICR covers Phase I.			
Value (quantitative or	A few number of best practice cases available	15 cases per year in the last year of the two-phase program	No target established	Six cases were developed. In addition, a technical guide, four technical books, and four specialized manuals were published.
Date achieved	09/30/1999	06/30/2006	06/30/2006	06/30/2006
Comments (incl. %	Indicators correspond to 10-year period. Completion is estimated for Dec 2009 but system limitations do not allow post-dating Original Target Date. Current ICR covers Phase I.			

Comments (incl. % achievement)	Indicators correspond to 10-year period. Completion is estimated for Dec 2009 but system limitations do not allow post-dating Original Target Date. Current ICR covers Phase I.			
Indicator 5 :	EE products are tested, labeled and certified: 12 types of products in the last year of the two-phase program. **Indicators correspond to 10-year period. Completion is estimated for Dec 2009 but system limitations do not allow post-dating Target Date.**			
Value (quantitative or Qualitative)	5 types of products tested, labeled and certified	12 types of products tested, labeled and certified		13 types of products have been tested, labeled and certified
Date achieved	09/30/1999	06/30/2006		06/30/2006
Comments (incl. % achievement)	Additional 10 additional products are in the process. It is important to mention the two Mobile Labs for auditing hydraulic systems: one for industries and the other for Sewage and Water systems.			
Indicator 6 :	Increased public awareness and use of EE products, services, and/or actions by public authorities, utilities, and consumers, 30% of PROCEL's brand recognition. **Indicators correspond to 10-year period. Completion is estimated for Dec 2009 but system limitations do not allow post-dating Original Target Date. Current ICR covers Phase I.**			
Value (quantitative or Qualitative)	Minimal PROCEL's brand recognition	30% of PROCEL's brand recognition	n/a	45% of PROCEL's brand recognition
Date achieved	09/30/1999	06/30/2006	06/30/2006	06/30/2006
Comments (incl. % achievement)	A campaign was aired on TV until December 2005. After that a new consumer survey was carried out. Its results showed a positive impact on consumer awareness about PROCEL and the recognition of the "PROCEL Seal" for efficient equipment.			
Indicator 7 :	Increased number and type of EE products and services are available. **Indicators correspond to 10-year period. Completion is estimated for Dec 2009 but system limitations do not allow post-dating Original Target Date. Current ICR covers Phase I.**			
Value (quantitative or Qualitative)	EE labeling available for some products.	10% of equipment sales are Class A.		Data is not available as most of the project activities were implemented in the last two years and the PROCEL is conducting a new market survey, the results of which will be available early next year.
Date achieved	09/30/1999	06/30/2006		06/30/2006
Comments (incl. % achievement)				

(b) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target	Formally Revised	Actual Value Achieved at
Indicator 1 :	**Number of Solar Water Pre-heating Equipment by CPFL**			
Value	No equipment installed	To install 500 solar	To install 210	210 solar water pre-heaters
Date	09/30/1999	12/31/2003	12/31/2004	12/31/2004
Comments	100% achieved. Most efficient solar water heaters annually awarded “PROCEL Seal of Energy			
Indicator 2 :	**Energy Efficiency Reference Center is fully operational**			
Value	Information	Best practice program is	To establish an	The EE Information
Date	09/30/1999	02/28/2001	11/30/2005	12/31/2005
Comments	95% achieved. Problems w/service provider delayed portal launch			
Indicator 3 :	**Goniophotometer, solar heating systems laboratory tester and hydraulic systems laboratory tests are**			
Value	Goniophotometer and	A strengthened testing,	To have all the	Goniophotometer, Solar

Indicator 4 :	**Research on the industrial, commercial, residential and public sectors are completed.**			
Value (quantitative or Qualitative)	The last survey about the EE Brazilian market was done in 1988.	Global market performance information and evaluation systems implemented and operating	Brazilian market and Consumers habits data available in a Report	Market survey was concluded in 2005 for 12.772 low-voltage consumers and on June, 2006 for 1621 high-voltage consumers (commercial and industrial consumers, and public buildings).
Date achieved	09/30/1999	12/31/2000	06/30/2006	06/30/2006
Comments (incl. % achievement)	95% achieved - Relevant reports, such as the Social and Environmental Impacts assessment of PROCEL's efforts, and the Conservation Potential research, have not been concluded, but are expected to be complete by the end of 2006.			
Indicator 5 :	**Number of people that received technical training**			
Value (quantitative or Qualitative)	Not established	100% of training implemented	1800 people	2650 people
Date achieved	09/30/1999	12/30/2004	12/30/2004	12/30/2004
Comments (incl. % achievement)	Over 1300 % of achievement			

Annex 2. Restructuring (if any)

Restructuring Date(s)	Board Approved GEO Change	ISR Ratings at Restructuring		Amount Disbursed at Restructuring in USD M	Reason for Restructuring & Key Changes Made
		GEO	IP		
05/07/2003	N	S	S	0.68	The 2001 energy supply crisis and the subsequent power rationing instituted by the Government led to a reduction in electricity distribution companies' revenues, with severe negative impact on their finances. As a consequence, electricity distribution companies became less interested in investing in energy-intensive energy efficiency initiatives. In addition, companies in financial difficulty would want to avoid borrowing in dollars and increasing exposure to exchange risk. The lack of progress in the implementation of Component A (not due to management failure, but rather due to lack of demand from the utilities) motivated a project restructuring in July 2003 and, later on, in March 2004, the total cancellation of the Bank loan. The GEF funding was reduced from USD 15 million to 11.9 million.

Annex 3. Project Costs and Financing

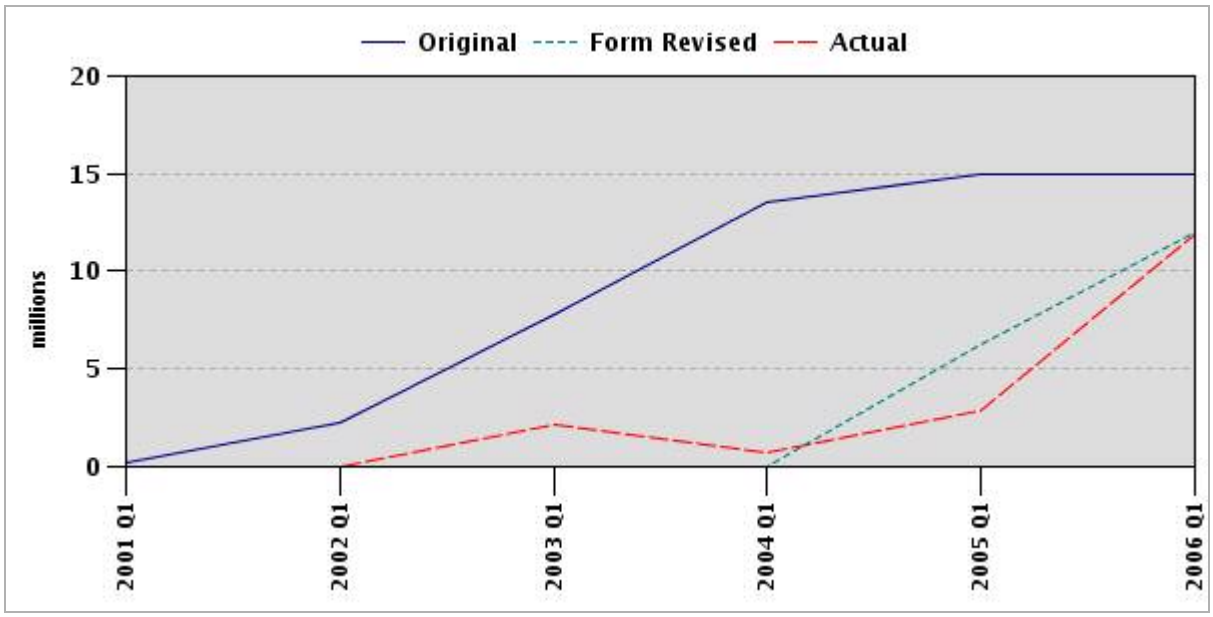
(a) Project Cost by Component (in USD Million equivalent)

Components	Appraisal Estimate (USD M)	Actual/Latest Estimate (USD M)	Percentage of Appraisal
DEMONSTRATION PROJECTS	69.10	0.50	0.72
CORE SUPPORT ACTIVITIES	15.30	37.1	242.48
CAPACITY BUILDING MODULE	11.40	11.40	100.00
Total Baseline Cost	**95.80**	**49.00**	
Physical Contingencies	10.05		
Price Contingencies	18.80		
Total Project Costs	**125.10**	**49.00**	
Front-end fee PPF	0.00	0.00	0.00
Front-end fee IBRD	0.40	0.00	0.40
Total Financing Required	**125.50**	**49.00**	

(b) Financing

Source of Funds	Type of Cofinancing	Appraisal Estimate (USD M)	Actual/Latest Estimate (USD M)	Percentage of Appraisal
Borrower	joint co-financing	0.00	2.40	

(c) Disbursement Profile



Annex 4. Outputs by Component

Component A: Demonstration Projects

(a) Promotion of Solar Water Pre-Heaters in the State of São Paulo

Output sought: To demonstrate EE products, services and delivery arrangements.

Target: To install 500 solar water pre-heaters in the state of São Paulo; develop a testing, certification and labeling system; and help commercialization of solar heaters in the marketplace.

Revised Target: To install 210 solar water pre-heaters in the state of São Paulo; develop a testing, certification and labeling system; and help commercialization of solar heaters in the marketplace

Actual: 210 solar water pre-heaters were installed by CPFL in the municipality of Americana (state of São Paulo), representing estimated energy savings of 160 MWh/year. A testing, certification and labeling system was completely implemented. The more efficiency solar water heaters have been awarded the PROCEL Seal for Energy Efficiency every year. The acquisition of the solar simulator for the PUC-MINA GERAIS lab significantly reduces the testing time need for solar water heaters.

Component B: Core Support Activities

(a) Information Dissemination and Marketing

Output sought: To make credible information available on new EE products, services, and delivery mechanisms.

Targets: To establish an information center, and to elaborate and implement a marketing plan. *Actual:* The EE Information Dissemination Center has been developed since 2004, and the internet portal, PROCEL-info, has been operating under beta version since November 2005. The customer service center, SAC, has also been installed. The portal (http://wwwp.eletrobras.com/procelinfo/main.asp) is expected to be officially launched by the end of 2006.

Actual: A marketing strategy was defined, and a marketing plan was elaborated. A marketing campaign was designed to implement the plan, and, specifically, to increase consumer EE/ PROCEL awareness. The main campaign was aired on TV until December 2005, after which a new consumer survey was carried out. The survey showed a positive impact on consumer awareness of the PROCEL itself and the PROCEL seal for efficient equipment. Public recognition of the PROCEL seal increased from 35 percent to 45 percent due to the marketing campaigns.

(b) Testing, Certification and Labeling Program

Output sought: To improve the market for EE products and services through better information and market procedures, with a system to evaluate global market performance.

Targets: To have all the laboratories – Lighting Equipment Lab, Hydraulic Systems Lab, Solar Heating Systems Lab, and Air Conditioning Lab – fully operative; to install new testing equipment in a number of existing labs; to define EE standards in order to comply to the LEE.

Actual: The Lighting Equipment Lab was completed with the acquisition and installation of the goniophotometer at the CEPEL. In addition, the Hydraulic Systems and the Air Conditioning labs were installed at Universidade Federal de Itajubá and CEPEL, respectively. A solar simulator was imported and installed at the Solar Systems Lab, at PUC-Minas Gerais. Other labs around the country have been equipped, including another lighting equipment lab (LACTEC-Paraná), five labs for the testing of electronic equipment, and a lab specialized in the testing of wind turbines. The overall targets of this subcomponent – which was strengthened during the project restructuring – have been achieved. However, over the course there were some delays in equipment delivery.

With respect to the support to LEE, MME and Eletrobrás decided to cancel the activity. This was motivated by the difficulties of Coppetec, a University consortium hired to carry out the study, to deliver the reports on time. Nonetheless, MME continues to develop the standards for different equipment with its own resources.

(c) Market Assessment Program

Output sought: To research the industrial, commercial, residential and public sectors with the aim of updating the information about the acceptance of the EE equipments by the market.

Target: To design and conduct a market survey; and compile and report its results.

Actual: field work and market survey are concluded in 2005 for 12,772 low-voltage consumers and in June 2006 for 1621 high-voltage consumers (including high-voltage commercial and industrial consumers, and public buildings). The Social and Environmental Impacts assessment and the Conservation Potential research are under the way and are expected to be complete by the end of 2006.

Component C: Capacity Building Module

(a) Training and Education

Output sought: to ensure that strategically people linked to the Brazilian educational system are capable to understand and promote the EE Program.

Targets: to train 1800 people; to publish 2 technical guides and 10 best practice cases;

and to have the video-conference facility fully operative.

Actual: the training of 2650 people in 86 different courses was concluded in 2004. The general feedback from the participants was positive, the average rating for these courses being 9 out of a scale of 10. According to another survey conducted following the trainings, 98 percent of the respondents said the knowledge acquired in the training courses were useful and 57 percent of them subsequently implemented an energy efficiency measure in their workplace.

In 2005 a technical guide, four technical books, four specialized manuals, and six best practice cases were published. The video-conference system was installed at CEPEL and inaugurated in 2004, and is being customized in 2006.

(b) Support to Project Management, Evaluation and Information Systems

Output sought: to establish an enhanced program management unit with capability to learn by doing and adapt the EE program based on evaluation of market performance of EE activities and participants.

Targets: to have fully established the project management unit (PMU) and to have selected counterpart staff by the fourth quarter of 1999; to have the Enhancement of Program monitoring and information system in place by July 2000.

Actual: The PMU was set up but it was understaffed with insufficient capacity in the first years of project implementation and the process of staffing the PMU faced significant initial delays, caused by the downsizing of Eletrobrás. Because the PMU was not fully established, the conditions of effectiveness were not met within the original deadline and the project implementation was significantly behind schedule until the project was restructured in 2003. In the last three years of project implementation, the PMU capacity was significantly improved and the implementation progress was satisfactory.

The computer equipment required for the project implementation was installed and has been in use.

Annex 5. Economic and Financial Analysis (including assumptions in the analysis)

The only demonstration activity in this project, promotion of solar water pre-heaters in the state of Sao Paulo, was shown to be economically justified at the PAD stage. However, because the low-income households for which the project target got electricity for free as a result of the government's welfare program, they had no incentives to adopt solar water pre-heaters for a nominal fee. Thus only 210 heaters were distributed instead of the original target of 500 units.

Annex 6. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	Responsibility/Specialty
Lending			
Sati Achath	Consultant	ECSIE	
Amarquaye Armar	Lead Energy Specialist	ETWEN	
Jordan E. Blackman	Consultant	LCSEG	
Jose Augusto Carvalho	Consultant	LCSPT	
Nelson De Franco	Consultant	LCSEG	
Howard S. Geller	Consultant	LCSEG	
Orville F. Grimes	Consultant	LCSEN	
Charles Guinn	Consultant	EASEG	
Winston C. Hay	Consultant	AFTEG	
Vladimir T. Jadrijevic	Consultant	LCSEG	
Eric Martinot	Sr Environmental Spec.	GEF	
Herman J. Nissenbaum	Consultant	LCSPS	
Arturo S. Rivera	Sr Energy Spec.	EASTE	
Romelia Schneider	Procurement Analyst	LCSPT	
Luis M. Vaca-Soto	Consultant	LCSEG	Former task team leader
Julius A. Wilberg	Consultant	AFTEG	
Supervision/ICR			
Susan G. Goldmark	Sector Manager	LCSEG	
Todd M. Johnson	Sr Energy Spec.	LCSEG	Task team leader
Patrick Kann	Junior Professional Associate	LCSFR	
Raffaella Maria Lisboa Mota	E T Consultant	LCSEG	ICR co-author
Jayme Porto Carreiro	Consultant	LCSEG	Former task team leader
Xiaoping Wang	Energy Spec.	LCSEG	ICR co-author

(b) Ratings of Project Performance in ISRs

No.	Date ISR Archived	IP	GEO	Actual Disbursements (USD M)
1	03/10/2000	Satisfactory	Satisfactory	0.00
2	07/15/2000	Satisfactory	Satisfactory	0.00
3	11/22/2000	Satisfactory	Satisfactory	0.00
4	03/02/2001	Satisfactory	Satisfactory	0.00
5	09/26/2001	Satisfactory	Satisfactory	0.00
6	11/30/2001	Satisfactory	Satisfactory	0.00

7	05/29/2002	Satisfactory	Satisfactory	2.18
8	11/13/2002	Satisfactory	Satisfactory	2.18
9	05/30/2003	Satisfactory	Satisfactory	0.68
10	12/10/2003	Satisfactory	Satisfactory	0.68
11	05/17/2004	Satisfactory	Satisfactory	1.25
12	06/10/2004	Satisfactory	Satisfactory	1.72
13	08/23/2004	Satisfactory	Satisfactory	2.87
14	06/11/2005		Satisfactory	8.21
15	11/11/2006		Satisfactory	11.90

(c) Staff Time and Cost

	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands
Lending		
FY97		30.76
FY98		71.68
FY99		44.90
FY00		33.39
FY01		3.53
FY02		0.00
FY03		0.00
FY04		0.00
FY05		0.00
FY06		0.00
FY07		0.00
FY08		0.00
Total:		**184.26**
Supervision/ICR		
FY97		0.00
FY98		0.00
FY99		0.00
FY00		47.31
FY01		40.34
FY02		41.20
FY03		42.44
FY04		43.77
FY05		65.67
FY06		69.75
FY07		32.20
FY08		0.00
Total:		**614.25**

Total:		**614.25**

Annex 7. Detailed Ratings of Bank and Borrower Performance

Bank	Ratings	Borrower	Ratings
Ensuring Quality at Entry:	Moderately Unsatisfactory	Government:	Moderately Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Moderately Satisfactory
Overall Bank Performance:	Moderately Satisfactory	**Overall Borrower Performance:**	Moderately Satisfactory

Annex 8. Beneficiary Survey Results (if any)

There was no beneficiary survey conducted for this project.

Annex 9. Stakeholder Workshop Report and Results (if any)

There was no stakeholder workshop for this project.

Annex 10. Summary of Borrower's ICR and/or Comments on Draft ICR

Annex 11. Comments of Cofinanciers and Other Partners/Stakeholders

Annex 12. List of Supporting Documents

1. Brazil Energy Efficiency Market Assessment Reports
2. PROCEL Technical Books for different energy efficient products and processes
3. PROCEL Practical Manuals for different energy efficient products and processes

Annex 13. Note on Cancelled Operation: Report No. NCO0000262 (IBRD-45140)

(attached separately)

MAP: IBRD 33377