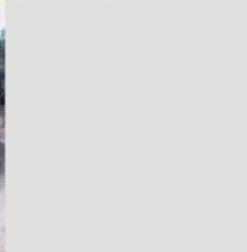




Final Report - *BCEEP*

2000/2003

Brazil Clean and Efficient Energy Program



USAID/Brazil
CA 512-A-00-00-00058-00





Contact information:

Claudio Moises Ribeiro
Winrock International Brazil
Phone/Fax: +55 (71) 273-6106
E-mail: cribeiro@winrock.org.br

TABLE OF CONTENTS

Executive Summary	3
Highlights.....	4
Introduction	6
Section I – The Renewable Energy Environment in Brazil from 2000 to 2003	8
Section II. Contribution of the BCEEP Program to the Development of the Renewable Energy and Energy Efficiency Market in Brazil from 2000 to 2003	11
Policy Promotion.....	11
Project development – Increased Availability of Funding.....	20
International Technology Cooperation.....	26
Cross-Cutting Activities.....	27
Section III – Success Stories and Lessons Learned	32
Success Stories.....	33
Lessons Learned.....	46
Section IV - Impact on indicators and evaluation of SO₂ indicators as a real project performance monitoring tool	50
IR 2.1 – Targeted policies promoted that foster clean and efficient energy production and use.....	51
IR 2.2 - Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use.....	53
IR 2.3 - Increased availability and use of financing for clean and efficient energy production and use.....	54
IR 2.4 Increased technology cooperation between U.S. and Brazilian firms for clean and efficient energy production and use.....	56
Evaluation of SO ₂ Indicators.....	57
V Sustainability Plan for the BCEEP actions after the end of the award	60
Energy Efficiency Market Development.....	60
Renewable Energy Policy Development.....	60
Partnerships with the Public Sector.....	61
Renewable Energy Project Financing.....	61
Productive Applications.....	62
Attachments	64
A. Real and personal property procedures: disposition of all acquired property and equipment.....	65
B. Description of contents of enclosed CD-ROMs.....	68
C. List of acronyms.....	69
D. Final Financial Report.....	71

Executive Summary

From October 2000 to September 2003, the Brazil Clean and Efficient Energy Program (BCEEP) achieved important successes in promoting the utilization of renewable energy and energy efficiency technologies in Brazil for the mitigation of global climate change, promotion of market-based mechanisms/private investment, and poverty alleviation via the application of innovative, clean-energy technologies. Few programs have captured such a rich experience from so many different partners, each with a unique skill set. Some activities were clearly pioneering. BCEEP successes spanned a very wide range of activities including local NGO capacity building, policy/regulatory changes, demonstration projects, and innovative financing/contractual mechanisms. Brazil stands to reap the developmental and environmental benefits of this experience for many years to come.

Under BCEEP, approximately 38,000¹ people benefited directly from capacity building and energy service projects. These actions targeted remote populations, native peoples, at-risk youth, staff of NGOs, public agencies and the general public. Training initiatives alone reached more than 1,700² beneficiaries. Some quantitative results are shown in the following table organized according to USAID intermediate results:³

Projected and Attained Results⁴

Intermediary Results Indicator			Projected ⁵	Attained FY 2001	Attained FY 2002	Attained FY 2003	Attained (cumulative)
	IR 2.1/Ind. 2.1.1	Number of steps in the development of policies	5	9	6 (7)	13	29 (30)
	IR 2.2/Ind. 2.2.1	Number of key actors	7	1	4 (6)	5	10 (12)
	IR 2.3/Ind. 2.3.1	Number of projects underway	34	4	61 (10 ⁶)	8	73 (22)
	IR 2.3/Ind. 2.3.2	Non-USAID resources leveraged (US\$ million)	99.7	3.98	10.2 (10.2)	11.82	26 (26)
	IR 2.4/Ind. 2.4.1	Number of Brazil/USA cooperation initiatives	7	1	4 (3)	3	8 (7)
	IR 2.3/Ind. 2.4.2	Number of cooperation projects	9	1	4 ⁷ (3)	5	10 (9)

¹ Only those who worked directly with BCEEP are counted for direct beneficiaries; for example, people attending a training by BCEEP, or receiving technology, supplies, loans, grants, or technical assistance. For the calculation of direct beneficiaries, local partners' data gathered from databases of the targeted communities, projects' records and population census were used. When data was not readily available, some critical assumptions were made, such as 20 students and 2 teachers per school, and 5 people per rural family benefiting from PV systems.

² The number of beneficiaries of the training initiatives was extracted from the event's attendance lists. Data for a specific event was obtained with Luís Eduardo Magalhães Foundation.

³ 1. Targeted policies promoted that foster clean and efficient energy production and use; 2. Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use; 3. Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use; 4 Increased technology cooperation between U.S. and Brazilian firms for clean and efficient energy production and use.

⁴ Values in brackets correspond to the independent consultant Marcia Cotta's interpretation of results attained.

⁵ Cumulative values for fiscal years 2001, 2002 and 2003. Refers to the value to be achieved by the end of FY2003.

⁶ The various projects developed by ABESCO members were counted as 1 project (independent consultant's choice).

⁷ Discounting one of the Vibhava's projects wrongly counted in the BCEEP's FY Annual report.

The targets outlined in the Implementation Plan⁸, prepared in accordance with the USAID Brazil Energy Program strategic objectives, were met or exceeded in five of the six IR areas, even though the program was not fully funded (a reduction of around 10% occurred). Results for each IR Indicator are presented in the table above. While the area of Finance did not reach the amount to be leveraged, the factors that caused this setback in investment were not restricted to the RE/EE field in Brazil, but in fact contributed to the poor performance of financial investment worldwide.

Highlights

This report documents innumerable experiences undertaken during the course of this three-year program. BCEEP pursued objectives in Policy Promotion, Capacity Building, Project Development, International Technical Cooperation, and Cross Cutting Activities. As detailed in this report, through a variety of mechanisms, most of the initiatives developed under BCEEP will be sustained in the upcoming years.

Policy Promotion. In the Policy arena, BCEEP helped to include issues related to universal access and renewable energy in Law 10.438/2002 - Brazil's principal renewable energy legislation. Specifically, the Law created the PROINFA program calling for federal acquisition of 3,300 MW of biomass, wind and small hydropower, and the technical support provided by BCEEP during its development and approval was crucial. In approving the Law, the Government of Brazil established landmark legislation for a cleaner electricity generation mix and mandatory universal access to electricity services. BCEEP was also very active in regulatory affairs, having defended positions in five public hearings and producing some twenty white papers. BCEEP also made possible the participation of consortium members in high-level policy dialogues (CNPE, GCE and GVEP, for example). This permanent presence has not only influenced the development of policy supportive to renewable energy and energy efficiency technologies but also resulted in the engagement or support of key stakeholders.

Capacity Building. This component also registered important successes, such as the establishment and consolidation of RENOVE, Brazil's first network of NGOs with a specific interest in renewable energy. RENOVE has over thirty members and is an active player in renewable energy policy at the federal level, having been recognized for its importance by the Congressional Committee on Mines and Energy and several ministries, partnering with government agencies to improve the utilization of renewable energy technologies in Brazil. During the Program, RENOVE evolved from an idea to an institution legally established, with an active board and with a sustainability plan prepared by its executive secretary. BCEEP has also greatly enhanced the institutional capabilities of its consortium partners, resulting in a profound transition in CERPCH, for example, which evolved from an academic technology center to a dynamic market player with a portfolio of projects of over 200 MW. In energy efficiency, BCEEP allowed ABESCO, the association for energy service companies, to become a strong EE industry representative and facilitator of the EE market. Today ABESCO is hosted by FIESP and supported by National Industry Confederation (CNI), reaching an audience of big energy consumers across the country. The association also played an important role in the Ministry of Mines and Energy program for Revitalization of the Electric Sector and recently developed a model of the framework and criteria for accreditation of ESCOs financed by PROCEL, a key federal agency promoting energy efficiency. Many other institutions which benefited from the BCEEP, including Ider, Eco-Engenho, Banco do Povo and others are detailed in this report.

⁸ Technical Application submitted to the REA no. 512-00-005.

Finance. BCEEP undertook bold and varied initiatives in clean energy finance including the development of micro-finance mechanisms, revolving funds, venture capital funds, public sector finance, specialized ESCO non-recourse shared savings schemes, and small-scale productive uses finance mechanisms. In renewable energy, seventeen projects were financed by non-USAID sources, mostly solar photovoltaic systems for water pumping and purification, remote school and household electrification, ice-making and micro-irrigation for organic agriculture. When large-scale projects that depended on certain public policies and foreign investment failed to move forward, alternative mechanisms such as revolving funds and micro-credit were explored. A new model was developed to overcome legal and regulatory barriers for government-subsidized mini-grids for remote communities. In the latter part of the Program, BCEEP directed increased attention to the development of productive uses that could generate the income needed for self-financing. Solar drying of fruits and algae and micro-irrigation are a few examples of productive applications explored under BCEEP.

In energy efficiency, BCEEP played a major role in structuring an incipient market in which solutions to ESCO finance were center stage. A Financial Task Force was established, developing sophisticated financial models and contractual mechanisms for third party private sector investment in energy efficiency improvements. For example, Brazilian institutions were enabled to apply a state-of-the-art monitoring and verification protocol. Tools such as this are expected to open this market in coming years provided banks can be brought into the market. Some 55 energy efficiency projects with a corresponding private sector investment of US\$ 7.24 million were identified and developed.

Technology Cooperation. BCEEP fostered technical cooperation between U.S. and Brazilian clean energy companies. Cooperation between American and Brazilian organizations was achieved through eight initiatives leading to the development of ten international cooperation projects. Examples include technology supply (monitoring and verification, solar photovoltaic, cogeneration technology and small solar drier technology), and initiatives under the United Nation's B-REED Program. A Trade Guide (jointly with LWA) was also an important instrument in disseminating information about Brazilian renewable energy market opportunities.

Introduction

This report and its annexes are intended to describe and document the Brazil Clean and Efficient Energy Program (BCEEP) over its duration, corresponding to the period of October 2000 to September 2003. All relevant documents generated under this program are recorded in the accompanying CDROMs (please refer to annex B for a description of contents).

On September 2000, USAID/Brazil Energy Program, through the Cooperative Agreement number 512-A-00-00-00058-00, selected the consortium led by Winrock International to carry out a comprehensive program aimed at “increasing adoption by key actors of concepts, methods and technologies for clean and efficient energy production and use”, contributing to the Agency’s global goals of having the “threat of global climate change reduced” and the “use of environmentally sound energy services increased”. The project’s goal has been to increase local public, private and non-profit sector capacity and the availability of financial resources for renewable energy (RE) and energy efficiency (EE) technologies to meet economic and social development needs, while minimizing associated environmental impacts that lead to global climate change (GCC). This program was to address this subject and respond to the Agency’s targets for a set of intermediate results defined under USAID’s Strategic Objective 2, namely:

1. Targeted policies promoted that foster clean and efficient energy production and use.
2. Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use.
3. Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use.
4. Increased technology cooperation between U.S. and Brazilian firms for clean and efficient energy production and use.

The consortium was composed of a multidisciplinary and complementary set of institutions consisting of NGOs, associations, consulting firms, universities and reference centers based in Brazil and abroad, and encompassing both the renewable energy and energy efficiency fields. At some time during the three-year period, the following nineteen institutions took part of the implementation team alongside Winrock: A2R, ABESCO, APAEB, APEG, BANCO DO POVO, CBEE, CENBIO, CERPCH, CH Consultoria, ECO-ENGENHO, ECONERGY, IDEAAS, IDER, IIEC, INEE, NREL, SEEDS, UNIFACS, VIBHAVA.

The environment, a moving target. BCEEP was born and developed under a very complex and changing context, as described in Section I Just as an example, the Brazilian Ministry of Mines and Energy was presided over by three different ministers during BCEEP’s lifetime. Changes in second- and third-level positions accompanied changes in the highest level, or were even more frequent. This fact, added to the severe electric power supply crisis in 2001, the recent election of a new President and, internationally, the crisis in Argentina and the market retraction post-September 11 impacted the program, especially with regards to leveraging non-USAID funding. Lastly, BCEEP also made adjustments to accommodate the impacts of local currency devaluations during the course of the Program as they complicated the development of power projects in Brazil.

This environment, however, also offered unique opportunities. Because of the limited power offer in 2001, a strong interest arose in promoting the development of energy efficiency and all power sources

BCEEP

USAID / Brazil Clean and Efficient Energy Program

that could, in a short time, deliver complementary power to the grid. The following discussion documents how BCEEP adapted to the changing environment and seized opportunities to achieve expressive policy-related results within a constantly changing environment.

Project History. This report is complemented by a CDROM in which the reader can find a copy of every relevant document related to BCEEP over its lifetime. For a list of the files in the CD, please refer to annex B.

Acknowledgement. Winrock would like to thank USAID and its staff for funding and managing this important and complex program and thank our many partners who, together with Winrock, comprised a comprehensive and skilled network of leading NGOs and other institutions dedicated to make positive and lasting changing in Brazil's clean energy markets. We believe the collaboration created under BCEEP will long outlive the program itself.

Section I – The Renewable Energy Environment in Brazil from 2000 to 2003

During the BCEEP Program, Brazil's electric utility sector underwent important changes in leadership and focus, both at the beginning (2001) and at the end (2003) of the program. Concurrently to these changes in the political scene, a combination of factors directly affected BCEEP progress.

The technological tenet associated with the Brazilian electric sector reform was, from its beginning, to use natural gas fired power plants to expand the energy offer to electricity market. As those gas-fired power plants would be installed near the load center, the need for investment in transmission lines was also lowered. Gas fired power plants and gas pipelines would then be responsible for diversifying Brazilian energy matrix lowering our dependence upon climatic aspects, such as rainfall. In order to turn that tenet into reality the Federal Government created the Priority Program of Thermoelectricity (PPT). The program offered a number of advantages and incentives to those willing to invest in the sector, but did not succeed in addressing the real issues behind the power investment in Brazil, such as regulatory risk, foreign exchange risk and very low energy prices practiced in the market. The PPT failed to add significant capacity to Brazilian power production complex and to a certain extent contributed to forthcoming energy crisis.

In 2001, extended droughts, rising electricity demand, and long-term lack of investment in power generation catapulted Brazil into its worst energy crisis in fifty years. By May the main hydroelectric reservoirs had become seriously depleted and it seemed that widespread blackouts were imminent. In response, the government focused its efforts on energy rationing and launched, firstly a national electric energy rationing plan and subsequently an Emergency Program for Thermoelectric Power, using diesel or fuel oil fired power plants on barges, on land or on trucks. With this objective, the government created and put into operation the Energy Crisis Management Council (GCE), which was responsible for regulating and managing the Emergency Consumption Reduction Program and the Strategic Electric Energy Program. The mandatory reduction in consumption applied to all sectors: residential, commercial, industrial and governmental, and since its inception in June 2001 succeeded in reducing the power consumption in the affected areas of the country by the required 20%.

Several other new political mechanisms arose from the energy crisis. The rationing plan recommended diversifying the energy matrix through other sources than natural gas, such as renewable energy as a means of easing the serious energy crisis that Brazil was then facing. Several concrete results, impacting RE and EE industries can be mentioned, such as:

- (i) Reduction of the Manufactured Goods Tax (IPI) to zero for some photovoltaic and wind power system equipment and components until December, 2002.
- (ii) PROEÓLICA emergency wind power program, which had the goal of installing and integrating into the grid up to 1,050 MW of wind energy by December 2003, which was included in the PROINFA created by Law 10438/02;
- (iii) The creation of the Technical Committee for Efficient Energy Use, whose aim was to propose measures for the conservation and wise use of electric power.

The energy rationing started in June 2001, ending in February 2002. The end of the rationing highlighted the return of the Ministry of Mines and Energy to the center of the decision arena in the electric sector. The Electric Energy Crisis Management Council (GCE), after an admittedly successful management of the consumption rationalization plan, proposed a set of measures, which aimed at

filling gaps and giving the Brazilian Electric Sector a new face, trying to rebuild players' confidence, especially investors. The GCE was restructured and renamed the Electric Sector Revitalization Committee and its most significant reference document was the Progress Report no. 3 (www.energiabrasil.gov.br), from which one could single out the decision of putting up for auction the energy being freed from the Initial Contracts. The end of the rationing period brought with it an uneasy feeling in relation to the increase in the rates, which was to pay for the connection to the grid of emergency diesel-fired power plants to improve system reliability and reduce the risk of blackout. Ironically, abundant rainfalls raised the reservoirs level, therefore reducing the need for such plants to operate.

The new Electric Sector Revitalization Committee did not deviate from the neo-liberalism orientation set forth in the Coopers&Lybrand Consultancy Report, but was not able to continue privatization process in the sector, nor complete the reforms foreseen in the Electric Sector Restructuring Plan (RESEB) in 2002. The Committee, ANEEL and other players were still struggling to put on tracks the Wholesale Energy Market (WEM). The news about defaults on the same process abroad (California, Chile, Argentina and, more recently, the UK) and the anticipation of presidential election campaign contributed to slow the sector's reform implementation and privatization in 2002.

Although the energy crisis brought about opportunities for increased participation of renewable and efficient energy technologies in Brazil, the shift in focus towards rationing disrupted the progress of selected lines of work in BCEEP's agenda in the first two years. Both the ANEEL resolution on universal electrification and Replacement Bill no. 2.905/00 were fundamental instruments for increasing production and disseminating the sustainable use of renewable energy sources; however, the publication of both was delayed because of the energy crisis, bringing other priorities to the table.

The cause of the delay was clear: at a time when electricity was being rationed, it seemed paradoxical to be encouraging new connections and obliging the concession companies to meet those goals. Renewable energy also was not an easy theme when the electric sector was struggling to avoid the worst in short run. Therefore the discussion of issues involving medium and long-term policies and directives were postponed to 2002, when Law 10.438 was enacted. This law should be welcomed as the most significant regulatory move towards the viability of renewable energies, energy efficiency, poverty alleviation (Low Income Consumer) and Universal Electrification in Brazil. The law came from the Provisional Measure 14, which dealt principally with the contracting of emergency energy and tariff reconciliation for energy distributors after the energy rationing. This new Energy Sector Law became, effectively, a revolutionary legal document of the modern Brazilian energy sector.

The Thermolectricity Priority Program (PPT) lost ground to the Alternative Energy Incentive Program (PROINFA). Through the PROINFA and Energy Development Account (CDE) provisions, however, Law 10.438 not only set ambitious objectives for renewable energy, but also guaranteed its participation in the makeup of the Brazilian energy matrix. At the same time, PPT faced an unexpected shortage in gas availability (due to lack in transport infrastructure) and an unclear regulatory scenario in the gas sector, mainly gas price policy, which led Petrobrás to cut, by approximately 50%, its planned gas-fired power plants.

Another important aspect in the combat of poverty was addressed by the new legislation. Low Income Consumers had historically been charged lower rates for electricity. In a provision in Law 10.438, the cutoff defining this category of consumers was increased to 80 kWh/month. Consequently, the number of consumers that fell within this new definition increased considerably.

The Alternative Energy Incentive Program was not fully regulated until 2003, as per request from the new government transition team.

Great expectations were created in the last year of BCEEP with the arrival of a leftist President to the seat of the Nation, in regard to the improvement of social condition in the country. On the other hand, a movement away from the principles launched in the Coopers&Lybrand document, especially concerning the privatization process, was put in practice. Restructuring within the government and the announcement of an upcoming reformulation of the electric sector led to an uncertain scenario and an increase in the Brazilian regulatory risk, which remains high at the end of the program.

The major changes in 2003 were the issuing of the long-awaited Resolution 223 that regulated universal access to energy services in Brazil, according to Law 10.438, and the announcement of a new commercial framework for the power sector. Resolution 223 determined that consumers would no longer be charged for grid connection expenses, which was the major bottleneck for universal access to electricity service. However, after a long period of financial losses due to more conservative consumer habits, resulting from the rationing period, and the current power surplus, the Utilities needed credit for their operations and for new investments. Resources from the Energy Development Account (CDE) were agreed to be the major source of those investments. Utilities have already presented their goals for 2004. Finally a new model for the electric sector was put forward by the government and has been under the scrutiny of the agents, awaiting a better moment to be brought to parliamentary discussion, now focused on other important reforms (social security and tax structure).

On the commercial side, the new model left the determination of prices up to the Federal Government. According to MME, there would be an agent that would buy the energy through long-term contracts with reduced risk for the seller, but at lower prices. These profound changes in course have been affecting the whole Brazilian Electric Sector and have stalled new investments. The weak financial position of the distribution utilities is making them resist investments in universal access, while definitions about PROINFA were delayed by the Federal government. The main players have been showing confidence in the new model but they are very conservative. Distribution utilities, for example, are showing concern stating that the new model is placing the market risk almost exclusively on them. The expectation is that only by the beginning of next year will the model be in place.

MME delayed the announcement of the Economic Values (VE), a reference price established by Law 10.438 for each renewable energy source, which would drive commercial relations between utilities and Eletrobrás in the first phase of PROINFA and would indicate the share of the CDE for the second phase. A public consultation was carried out and contributions were accepted by MME up to July 31st. As of Sept/03, the reference price remains undefined.

Section II. Contribution of the BCEEP Program to the Development of the Renewable Energy and Energy Efficiency Market in Brazil from 2000 to 2003

The activities developed and the results achieved by the WI Brazil office, BCEEP Consortium members and External Partners⁹ over the last three years under the BCEEP are described below. The program directly benefited 38,200 people and 54,100 indirectly not to mention the benefits that may come from the seeds sowed and will only flourish in the next years.

Policy Promotion

By promoting policies and resolutions aimed at removing market barriers to clean and efficient energy technologies, BCEEP helped lay the foundation for a stronger, more mature RE/EE market in Brazil.

Law 10.348/2002

Notably, Winrock and its partners were actively involved in the preparation and promotion of the most important piece of RE legislation in Brazil, Law 10.438/2002, explained in section 1. In late 2001 and early 2002, the program concentrated efforts towards supporting the conversion of Provisional Measure 14/2001 into law and to ensure that both universal access and incentives for renewable energy projects were given due consideration. There was direct interaction of members of the consortium with the reviser, Congressman Mr. José Carlos Aleluia, and the Civil Affairs Minister and President of the Electric Energy Crisis Management Board (GCE), Mr. Pedro Parente. The efforts were successful and law 10.438 went into effect on April 26, 2002.

Other important accomplishments in the policy arena are highlighted below.

On-Going Monitoring and Participation in Policy and Regulation Development Efforts

BCEEP members participated actively in ANEEL's Public Hearings, analyzing draft resolutions and presenting contributions on a number of renewable energy/energy efficiency issues, as listed below. Through this engagement, the BCEEP succeeded in providing continuous input and feedback to the process, conveying the view of the third sector and reinforcing the roles of renewable and energy efficiency in the future of the energy mix in Brazil. Additional information regarding the public hearings can be found on ANEEL's website (www.aneel.gov.br).

⁹ Institutions that are not members of the consortium but that joined the team at some point to develop specific actions.

Table 1. BCEEP's contributions to Public Hearings

Public Hearing	Topic	Contributions	Final Resolution Number	Contributions incorporated? ¹⁰
AP001/2001	Energy Reallocation Mechanism (MRE) ¹¹ for small hydroelectric plants without centralized power dispatching.	Suggestions of a waiver of the 50-year flow rate record requirement when it is not available and of new quality indicators, among others.	169/2001	Yes, partially
AP012/2001	Enrollment contracts between utilities and Low Voltage Consumers	Net metering issues and the need for individual/specific contracts between utilities and consumers supplied through isolated RE systems.	615/2002	No
AP024/2002	The CCC ¹² subsidy	BCEEP's suggestions aimed to facilitate access to CCC by small-scale, renewable power generation projects.	784/2002	No (further incorporated in MP 127-03, see page 14 for details)
AP017/2002	Eligibility criteria and financial benefits for Small Hydro Power Plants	Comments recommending the expansion of benefits to include hydro power plants below 1,000 kW	Not published due to legal issues	-
AP015/2003	Universal Access to Electricity Service	Several recommendations such as the conditions to start an open bid process for Universal Access in areas unattended by utilities.	223/2003	Yes, partially

A second line of work was the development of policy-oriented white papers and letters and submission of these documents to key actors, as presented in Table 2.

¹⁰ Please refer to enclosed CD-ROM (folder P:\IRs\Policy\ANEEL's Resolutions and Public Hearing Records, for analysis of contributions and final Resolutions, and folder P:\IRs\Policy, for full text of contributions submitted).

¹¹ MRE provides for a minimum revenue for hydroelectric plants, thus decreasing the risk associated with these ventures, making them more attractive for investors.

¹² The CCC, or Fuel Consumption Account, is a fund that subsidizes the cost of diesel fuel purchase for isolated power generation.

Table 2. Reports, White Papers and other policy-oriented documents developed

Title	Submitted to	Developed by	Topic	Outcome
Regulation of the Quality of Electric Power Supplied by Autonomous Photovoltaic Systems	AGERBA (Public Services Regulating Agency of Bahia) and ANEEL	UNIFACS	Quality standards for distributed PV systems.	UNIFACS and AGERBA carried out a project to develop PV power supply quality standards.
ABESCO Program ¹³ for Reduction of Electricity Consumption in the Productive Sector and Stimulation of the Energy Service Market	Energy Crisis Management Council (GCE).	ABESCO	Reports on the ESCO industry focusing on the EE market development and needs for consolidating	ABESCO was invited to participate in MME's program for Revitalization of the Electric Sector, developed a proposal of a holding which would be backed/funded by BNDESPAR ¹⁴ to finance EE projects, and signed an agreement with PROCEL to create models of certification of ESCOs.
Plan of Action for the use of PV systems within the Luz no Campo Program	MME	Winrock	Benefits of adopting distributed PV systems through the program in the context of the current energy crisis.	Increased awareness by Eletrobras on the issue. Eletrobras subsequently approved COELBA's request of electrifying 9000 households using SHS in Bahia under Luz no Campo.
Proposal of a resolution on biomass energy.	GCE	CENBIO	Compulsory purchase of energy from biomass sources	Technical information used by the GCE for planning emergency measures during the crisis.
Technical paper	GCE	CENBIO	Implementation of the BIO.COM ¹⁵ program.	Technical information used by the GCE for planning emergency measures during the crisis.
Letter of support from RENOVE	Secretary of Energy	RENOVE	Replacement Bill no 2.905/00	Network's support for this relevant legal instrument and assistance to the reviser.
White Paper on Universalization	MME and Eletrobrás	WINROCK	Universal Electrification, renewable energy targets and integration	Direct contribution to the PRODEEM's revitalization process under way. Subsidies to Eletrobras about synergies

¹³ The program suggests measures that would result in savings equivalent to 6.227.358 MWh in three years, distributed evenly among the industrial and commercial sectors and state owned companies. Such savings correspond to 785 MW, which represent an avoided investment of R\$ 2.448 billion in electric power for three years. Also proposed was the creation of a financing fund (Loan Guarantee Fund + Funding) for energy efficiency projects – FAPENE – which had as its main objective the provision of resources to guarantee the operational risk of loan contracts between banks and Energy Efficiency Service Companies - ESCO's, in order to invest in projects aimed at improving its client's energy efficiency.

¹⁴ BNDESPAR is a company owned by the Bank of Social and Economic Development of the Northeast (BNDES) that invests in private companies.

¹⁵ BIO.COM: Emergency Program for Biomass Energy in Brazil. The goal of BIO.COM was to install 2000 MW of electric power from biomass sources by December 2003.

BCEEP

USAID / Brazil Clean and Efficient Energy Program

Title	Submitted to	Developed by	Topic	Outcome
			with the third sector.	between PRODEEM and Luz no Campo Program.
“PRISMA – Energia Comunitária”	ANEEL, ABRADEE, MME.	WINROCK	Proposal of a model of decentralized rural electrification.	A White Paper and a proposal of the model were delivered to MME. A Workshop to discuss the model with MME and Eletronorte was held in Salvador on September 2003.
Analyses of Decree 4.541	MME	WINROCK	Winrock was asked by MME to carry out an extensive analysis of the decree . Comments submitted made specific recommendations on PROINFA and CDE.	Contributions received by MME and added to inputs received from other key actors in order to review the supporting legislation to Law 10.438.
ESCO9001	ABNT	ABESCO	Proposal of the Technical Standard for ESCOs	ABNT created a Working Group (CB-25/CE5/GT4) to discuss the draft. The proposal was extensively reviewed by GT4 workgroup and is currently under public consultation.
Energy Efficiency policy report	MME, also distributed at the International Round Table on EE financing	INEE	Comprehensive report on energy efficiency policy issues, including an analysis of the impacts of current price structures on efficiency investments and recommendations for price reform.	The report supplements ongoing discussions and is part of INEE’s strategy to engage the new government on policy issues relevant for EE.
RENOVE policy recommendations on Universal Access, PROINFA, income generation and biofuels	MME, PNUD, MCT, MMA, Eletronorte, Europe Union, ABRADEE and ANEEL	RENOVE	Suggestions to the policy development process with a third sector perspective.	Several stakeholders attending RENOVE’s Workshop. RENOVE was invited to participate in fronts in the Congress.
Analysis of Provisional Measure 127-03	National Congress/ House of Representatives	RENOVE	RENOVE provided fundamental contributions for the final text on the authorization, commercialization criteria and benefits for Small Hydro Power Plants under 1,000 kW	“Projeto de Conversão de Lei” PLV24-03 was approved on September 23 rd 2003.
Analysis of the proposal of the new electric sector model (PMSI)	MME	INEE	Submission of contributions regarding distributed generation and energy efficiency	Outcomes of this contribution could not be measured by the time this report was finished since the GOB was still analyzing the

BCEEP

USAID / Brazil Clean and Efficient Energy Program

Title	Submitted to	Developed by	Topic	Outcome
				contributions. The new model is expected for 2004.

In regards to fiscal policy, the following contributions are noteworthy:

Table 3. Contributions to renewable energy fiscal policy and incentives

Title	Submitted to	Developed by	Topic	Outcome
PV tax exemption	MME	Winrock	Analysis of Bill no. 4783/2001 and decree no. 3827/2001. White Paper identifying problems and proposing solutions.	Tax exemption approved (IPI and ICMS).
Tax and tariff incentives for renewable energy	GCE	UNIFACS	Identification and analysis of regulatory instruments and tax and tariff policies that could be applied to renewable energy sources in Brazil, and development of a proposal on tax and tariff incentives.	Subsidy for the discussion on the incentives that could be offered to investors at the time, mitigating the effects of the supply crisis.
Reduced interest rates on financing for biomass projects	GCE	CENBIO	Analysis of the effect of the reduced rates for BNDES financing	Subsidy for the discussion about the incentives that could be offered to investors at the time, mitigating the effects of the supply crisis.
“Electric Power Generation from Biogas from Urban and Rural residues”	Bureaus within the federal, state and municipal government.	CENBIO	Technical note which suggested the adoption of a new incentive policy for biomass similar to that of wind energy under the PROEOLICA Program ¹⁶	Subsidy for the discussions about PROINFA at the time.
“The Competitiveness of the Independent Energy Producers/Auto-Producers in Commercializing to Free Consumers in the Face of the New Tariffs Applied to	MME and ANEEL	CENBIO	Transmission tariff reductions for solar, wind and biomass power generation	Adoption by the federal government, through Law 10.438, of transmission tariff reductions for solar, wind and biomass power generation.

¹⁶ PROINFA, the National Program for Incentive of Alternative Energy Sources, created by Law 10.438, now incorporates this concept, including all the major RE technologies in its reach.

Title	Submitted to	Developed by	Topic	Outcome
the Use of the Distribution Systems.”				
Renewal of ICMS 101/97 tax exemption	CGE	WINROCK	Winrock participated in the discussions within the technical committees of GCE, contributing to the results achieved.	Extension to April 2004 of this tax exemption, applicable to equipment and components for the use of solar and wind energies, initially slated to expire in 2002.
Power Generation from Alternative Sources	CGE	UNIFACS	Study on the power industry tax matrix and fiscal incentives for power generation from alternative sources	The study provided information for subsequent proposals of fiscal incentives for RE.

Lastly, BCEEP members had on-going contact and involvement with key members and organizations of the energy sector. In particular, BCEEP members were active in the following strategic positions, facilitating the promotion of the RE/EE agenda:

- Eco-Engenho, UNIFACS, CENBIO, IDEAAS, INEE, RENOVE and Winrock participated in the technical committees of the CNPE.
- INEE, ABESCO, CENBIO and Winrock participated in the Technical Committees of the GCE, while it was active.
- ABESCO participated in all of the 8 subgroups of the Conservation section within the MME’s program for Revitalization of the Electric Sector.
- Winrock participated in the Regional Public Consultation for Latin America of the G-8 task force on Renewable Sources, held in Lima, Peru.
- RENOVE supported the proposal for the creation of a Special Sub-commission on Renewable Energy, under the Mines and Energy Commission of the House of Representatives, by Congressman João Caldas - PL/AL. The proposal was not approved for 2003, but work will continue to create the Sub-commission in 2004.
- RENOVE articulated its participation on a public hearing on Renewable Energy perspectives in Brazil at the House of Representatives.

Capacity Building - A Growing Network of Partners

The program was successful in strengthening key institutions that, as a result, have an increased role as developers of the RE market in Brazil. These actors will serve as multiplying agents for dissemination of information and training and development of projects in their respective areas.

RENOVE, the National Network of NGOs for Renewable Energy, sponsored by BCEEP throughout the program, grew in number of associates from 18 to 30 Brazilian NGOs. The Network has provided a framework for cooperation between member organizations and joins its members in a single and stronger voice to claim for the role of the renewable energy in the improvement of the quality of life

for rural populations. By providing training and capacity building; encouraging formulation of public policies for RE utilization; providing technical assistance and disseminating the findings, lessons learned and results; identifying credit lines for RE and supporting fund raising for sustainable social and economical projects for productive uses of RE, RENOVE is key to further the role that renewable energy can play for rural development in Brazil.

RENOVE is the most pure example of how BCEEP actions can result in public policy development. After celebrating its third anniversary, RENOVE is recognized by the energy commission of the Congress and several ministries as an active player in the field of renewable energy in Brazil and has been invited to participate in strategic decisions and public policy development. This is the main indicator of the success achieved by RENOVE not to mention its role in the promotion of information exchange among its members. During the past three years, RENOVE evolved from a concept to an institution legally established, with an active board and with a sustainability plan prepared by its executive secretary. In summary, a complete cycle has been completed by BCEEP starting from strengthening key NGOs, passing through the establishment of the network and ending at providing inputs for RE policy development.

Over the last three years, the support of BCEEP has allowed **ABESCO**, the Brazilian Association of Energy Services Companies, to grow in both number of associates and scope of work. Through a cooperation agreement with FIESP (São Paulo Industry Federation), ABESCO has been able to approach the industry, taking advantage of the energy supply crisis. Regional offices were implanted within the Industry Federation branches in 7 states. Two hundred ninety-eight industrial companies that are members of FIESP requested assistance with energy efficiency projects from ABESCO's 44 members ESCOs. ABESCO's presence turned out to be an effective tool in developing 55 energy efficiency projects, with a corresponding total investment of US\$ 7.24 million on the part of the private sector. Today ABESCO is hosted by FIESP and supported by National Industry Confederation (CNI). The association also played an important role in MME's program for Revitalization of the Electric Sector and recently developed a model of the framework and criteria for accreditation of ESCOs. BCEEP continually provided support to ABESCO over the project lifetime, allowing for a permanent staff, complemented by technical assistance from the other members of the consortium.

The **Alvorada Project**, a program of the Brazilian Federal Government created to broaden the reach of poverty alleviation programs within municipalities with low HDI, received support from Winrock, which set up 73 of the 130 Portals in Bahia, passing on technical and economic information on renewable energy, including financing and business opportunities. Because of this extensive dissemination campaign of renewable energy information, the Alvorada Portals were motivated to carry out a survey of energy needs of the rural schools within their areas. Based on the demands identified, Winrock succeeded in obtaining PRODEEM funds for PV Electrification of 52 Schools within the Alvorada Municipalities.

Through BCEEP's support, **CERPCH** evolved from a research and information center to a developer of SHP as business opportunities in the private sector, meeting a growing demand on the part of private investors for feasibility studies in this area. As a result, over the duration of the program CERPCH carried out 19 engineering studies and design projects at the request of private companies, who invested altogether, US\$33,000 in these feasibility projects. CERPCH has directly assisted in the negotiations of SHP plants with several private companies. The center gathered experience in preparing PPAs, assisting the entrepreneurs in meeting the requirements established by investors

BCEEP

USAID / Brazil Clean and Efficient Energy Program

(obtaining ANEEL’s letters of energy secured, signed PPAs, grid connection contracts and banking loan guarantees) and applying for the use of CCC.

The ESCO **Efficientia**, a new market-based key actor, was created during BCEEP. EIC lent assistance in establishing this ESCO within CEMIG, the electric utility of Minas Gerais state. EIC worked with Efficientia in providing assistance to a series of projects to be implemented by Efficientia, increasing the attractiveness of the project by considering carbon credits that may result from their implementation. A joint venture with the ESCO to take advantage of “eco-business” opportunities focusing on clean energy projects that will displace conventional fuel supply is envisaged.

BCEEP also succeeded in making PV systems accessible to rural customers by means of micro-credit offered by **Banco do Povo**. After taking part in a technology cooperation action with Sri Lanka credit agents and being trained in solar photovoltaic technology, Banco do Povo opened a R\$ 200,000 credit line for SHS and solar lanterns. Through close work with manufacturers, appropriate equipment was identified, and to date, Banco do Povo has imported 60 solar lanterns and 2 solar home systems, showcased equipments and financed 30 lantern units.

Through a partnership with IDER, the RENOVE member NGO **Terramar** became a proponent of the use of solar thermal power in the processing of marine algae. Fifteen people working with the production of dried algae were trained in the operation and maintenance of new solar drier equipment, which offers drastic improvements, in both quality and efficiency, compared to the standard open-air drying technique. The local producers became very familiar with the technology and plan to acquire additional solar driers.

More details on these initiatives are available in Section III.

Besides the program’s support to the actors mentioned above, **training initiatives** also significantly increased the degree of awareness of stakeholders, remote populations, native people, at-risk youth, staff of NGOs, public agencies and the public in general in regards to clean and efficient energies in Brazil.

Table 4. Workshops, seminars and other trainings

Title/Description	Where	Organized by	When	Outcomes
“Energia Novos Cenários” – Presentation of stakeholders about the role of renewable energy in the Brazilian future energy mix	Salvador	FLEM, Winrock, GTZ and IEEE	October to December 2001	Three sections delivered to 600 participants. A book published with all the presentations and distributed broadly. Partnership established between Winrock and FLEM.
Alvorada Project	Bahia	WINROCK	2002	Seventy-three Alvorada Portals received information on RE. Portals and Winrock subsequently succeeded in

BCEEP

USAID / Brazil Clean and Efficient Energy Program

Title/Description	Where	Organized by	When	Outcomes
				obtaining PRODEEM funds for PV Electrification of 52 Schools.
Renewable Energy Training for Youth at Risk in Ceará	Ceará	IDER, POMMAR	First training completed in July 2002	27 at-risk youth trained, 17 currently employed. The training course was certified by CEFET in 2003
Seminar on Energy Efficiency	RJ	INEE/IBMEC	May 14, 2002	Attended by over 100 people
Renewable Energy Technologies and Supply Models	Maceió	Eco-Engenho	May 2002	Focus on NGOs based in the northeast. 27 participants including 17 NGOs.
Workshop on EE Consumer’s Perspectives	RJ	IIEC	August 15, 2002	Dealt with the main barriers to EE projects as well as financing available. Over 50 people attended, from the private and public sectors.
Three Workshops for integration of ABESCO members and end-users	Various	ABESCO	2002	Attended by 350 people including entities of the sector that together represent over 3000 companies.
Micro-irrigation combined with organic agriculture	Bahia, Ceará	APAEB in Bahia, IDER in Ceará	2003	13 youths trained in Bahia and generating income for their families from the commercialization of organic products. 10 people trained in Ceará.
“Resíduos Pecuários: Gerando Soluções” – Event covering technology, financing legislation, risks and benefits related to biodigestion of agro-industrial residues.	Salvador	WINROCK, FLEM	May 2003	Engagement of Bahian stakeholders. Screening and field visits. Technical support delivered by Winrock to one poultry farm.
Course on Arbitration Procedures in Energy Contracts	RJ	IBMEC	July-August, 2003	Four-week course for 30 students
Performance contracting and measurement & verification, key concepts in the development of the energy efficiency market.	Rio de Janeiro	INEE, IBMEC	August 2003	Eleven ESCOs received training

Title/Description	Where	Organized by	When	Outcomes
Re-vitalization of the Luz do Sol Program	Alagoas	ECO-ENGENHO	September 2003	Thirteen enterprises were revitalized
Training for Yanomami on PV Systems Operation and Maintenance	Amazon	IDER, CCPY	September, 2003	16 youths from 8 villages of the Yanomami native tribe in the Amazon, . The course material was translated into Yanomami language.

Through technical, business and regulatory trainings, the program directly benefited over 1,700 people in total. Around seven hundred people, including key representatives from banks, ESCOs and private enterprises received information on energy efficiency.

Bridging the Gap Between Training and Job Opportunities for Youth at Risk

BCEEP also worked to bridge the gap between training school and the workforce for students who graduated from the RE training course offered during the program. Job opportunities in the area of solar and wind power were mapped, both for this particular group of graduates, as well as to determine the market demand for technicians in this field, guiding future training courses. The study concluded that, although still small, the market is growing fast in Ceará and will be consolidated in the next five years. The course also presented a significant employment rate of the students trained right after finishing the training (37%).

In the semi-arid of Brazil, thirteen youths trained in organic agriculture techniques in Valente, Bahia are increasing the income and quality of life in their community.

Project development – Increased Availability of Funding

The BCEEP Consortium worked with stakeholders in identifying projects, providing technical assistance, and fostering the involvement of financing parties in a wide range of areas during the program lifetime. In this way, a number of projects were implemented with non-USAID resources leveraged through the program. These achievements are listed below, grouped according to their nature.

i) Generating Solutions: the PRISMA Model for Rural Electrification

This model was part of a larger program effort to provide solutions for universal electrification in Brazil, which initially considered supporting rural cooperatives to become permissionaires. The concept of renewable energy-based permissionaires proved to be inadequate within the legal and institutional framework in place. Winrock developed an institutional, commercial and legal model to be applied to small-scale, distributed generation from RE sources for communities isolated from the conventional grid. After identifying and applying all the appropriate legal instruments pertaining, choosing the most appropriate model of purchase of electricity, which defined the role of all three parties PRISMA-utility-consumer, studying the different legal entities that could be applied to the PRISMA, defining the power purchase contract and associated instruments and analyzing the fiscal

and regulatory issues, Winrock carried out a road show to present the model to MME, IDB, Eletrobrás, ANEEL, UNDP, PRODEEM, NGOs and other stakeholders. Winrock continues to seek funding for the application of this model in two pilot sites.

ii) Joining forces with public programs

Power supply for rural electrification and basic services provision for remote communities and applications was a major concern throughout the program. In addition to working in the legal and political domain to promote a scale-up of renewable energy use and universal access of energy services, the Consortium took advantage of existing public resources to assist a large number unattended rural communities in the North and Northeast of Brazil. Efforts were made to identify communities in which other complimentary development initiatives were already being carried out, such as the Alvorada Program in Bahia.

➤ PRODEEM

Winrock and its partners succeeded in obtaining over US\$ 1.8 million from PRODEEM and other governmental funds for many of the potential projects identified, which allowed for the implementation of 25 PV water pumping and school systems in the Mamirauá Sustainable Reserve and the electrification of 341 schools with PV systems in the Northeast (Alagoas, Bahia and Ceará). BCEEP members also suggested several measures to improve the effectiveness of PRODEEM and have been consulted by the program's upper management. RENOVE was recently invited to participate in a very select committee that will help PRODEEM's coordination to define its strategic planning for the next years.

➤ Luz no Campo

BCEEP and other key actors in Brazil gave the Luz no Campo program the impulse to address for the challenge presented by the dispersed/low consumption rural households, through renewable energy solutions. As a result, COELBA allocated US\$5 million of its Luz no Campo funds to buy 9000 solar systems for PV electrification in Bahia. Systems were installed but a still-undefined regulatory environment has prevented the replication of this initiative in elsewhere in Bahia and in other states. In Ceará, an agreement between IDER and SEINFRA-CE was signed to electrify 30,000 residences through PV systems with Luz no Campo resources, but is on hold due to the similar barriers.

iii) Promoting alternative financing mechanisms: revolving funds and micro-credit

Although government involvement and subsidies are generally fundamental in providing the population with basic power services, BCEEP also investigated the feasibility of mechanisms such as revolving funds and micro-credit as self-sustainable alternatives for renewable energy financing, as described below.

➤ Micro-credit for solar systems

After carrying out a market study in 31 municipalities in Minas Gerais, Banco do Povo opened a micro-credit line in the amount of US\$60,600 (R\$200,000) for financing purchases of photovoltaic systems (solar home systems and solar lanterns). In the first three months of this new line of business, the agency financed thirty of the 60 solar lanterns acquired from the American manufacturer Unisolar. Banco do Povo also collaborated with a local service provider (a store named Eletropedro) which has begun to offer PV systems financed by the agency. Further details are available in Section III.

➤ *Financing through Revolving Fund*

Several rural communities in the Northeast benefited from the support of BCEEP partners in the implementation and administration of revolving funds. Fund administration consists of assisting the communities in keeping track of funds, buying replacement parts and maintenance material, providing technical assistance, and participating in meetings with the local government. IDER managed the revolving funds of 15 communities in the Northeast and a solar-powered ice factory. A software program was developed to assist APAEB with the management of the revolving fund for PV household systems and electric fences, which resulted in significant timesavings and increase in efficiency. Training was provided for APAEB's technicians to operate and manage the software. The fund is indexed by the price of the goat meat kg.

iv) A successful partnership with the private sector

To track financing opportunities for a permanent portfolio of over 30 projects in RE/EE, the BCEEP Consortium worked on appropriate financing mechanisms, contacted donors, banks and other funding sources and provided support for business development. The finance environment was severely influenced by national and international-level issues as described extensively in section 1. The main fronts developed by BCEEP in terms of engaging the private sector to leverage non-USAID money for project development are described below.

➤ *Clean Tech Fund: Closed after several drawbacks and institutional changes*

The main contribution of the BCEEP to the CTF was the support provided to A2R to keeping its staff on the road, developing the pipeline, contacting investors and promoting the Fund. The start of operation of the Clean Tech Fund was delayed several times from its initial date of October 2001. The main obstacle was leveraging the private counterpart to reach the US\$20 to 35 million dollars start-up capital. A series of events, led by the September 11th attacks, and followed by the continued crisis in Argentina, the uncertainties in the political scenario, the crisis in the middle east, and in general a worldwide reduction in foreign investment, stood in the way of the closing of the Clean Tech Fund. In spite of the problems faced by A2R in 2001 and 2002, Econergy continued to work to secure sufficient investors to close the CleanTech Fund, achieving this goal in 2003. Three to five projects will be financed in Brazil in the next years, probably in the sugarcane sector. The total amount secured for the CTF so far is US\$ 22.5 million from which an estimated 50% will be allocated to renewable energy and energy efficiency projects in Brazil.

➤ *Energy Efficiency Projects: the Financial Task Force and the ESCOs*

In 2001, BCEEP set up a Financial Task Force (FTF) to provide a forum for on-going dialogue between consortium members (INEE, EIC, IIEC and ABESCO) and financial agents on financing EE projects, improve adequacy of performance contracts, assist agents in the evaluation of specific projects, help develop mechanisms for financing EE projects, and assist in project design for CO² credits. The Financial Task Force successfully brought key financing agents to a series of events to discuss EE projects. Its key role in developing the EE market in Brazil was recognized by the World Bank, which in 2003, committed additional resources to the Task Force for the upcoming years. Initially, four projects will be selected to receive finance engineering involving Performance Contracts. The World Bank will test this and other financial mechanisms developed by the FTF under BCEEP to continue expanding the energy efficiency market. In parallel, ABESCO's members were extremely successful in carrying out EE projects within a broad range of industries. Over the period of fiscal years 2001 and 2002, taking advantage of the energy supply crisis, 25 ESCOs carried out 55

projects, with a total investment on the part of the private sector of US\$7.24 million (US\$ 3.77 in FY2001 and the remaining in FY2002).

➤ *Energy Efficiency and Pollution Prevention*

IIEC identified a textile company on which to carry out a case study for implementation of an E2P2 (Energy Efficiency and Pollution Prevention) project. IIEC extensively analyzed the main issues and barriers for financing E2P2 projects. A final report, containing barriers and solutions, was developed, as well as a brochure containing quick reference directed to end users and financiers, with guidelines for E2P2 projects and performance contracting. Up to the moment, no E2P2 project was financed.

➤ *SHP/MHP Project development: seeking for investors*

As mentioned earlier, the support of BCEEP allowed CERPCH to move from a research center to a business-oriented institution. Nineteen technical and financial feasibility studies were carried out by CERPCH at the request of private enterprises. These companies invested a total of US\$33,000 in such projects, willing to find energy enterprises that could attend their energy demands. Consequently, the Center linked supply and demand, intermediating negotiations between the interested parties. The projects account for an expected installed power of 216MW in the States of Minas Gerais, Santa Catarina, Pará, São Paulo and Rio Grande do Sul. The adverse commercial environment was always a threat to CERPCH, but significant advances were made, especially for the most promising SHP projects of Tiriós and Santíssimo River. Consultation letters were sent to Aneel, MME and Eletrobrás to plead benefits. Power purchase agreements were developed and started to be negotiated with the investors (aeronautics and a paper industry). Although no project was closed yet, mostly due to the uncertain regulatory scenario, it is now a matter of time until all formal steps are completed and these projects are implemented. To continue supporting the development of projects, CERPCH developed a booklet to guide investors that seek SHP projects as investment. The publication is available at the Center's website¹⁷.

➤ *Luz do Sol: learning from the past and starting a maintenance fund*

Through a long process of negotiation, in 2002 Eco Engenho was finally successful in transferring to itself a US\$200,000 agreement that the IDB had with FTV for providing institutional support to expand and replicate the micro-enterprise model for PV system leasing financed by Banco do Nordeste. Through the Luz do Sol program, 2640 PV systems were installed in Alagoas. The program is administered by local micro-entrepreneurs that manage a group of 30 customers and provides technical assistance and fee collection. Technical problems in the Luz do Sol Program were identified, leading Eco-Engenho to perform a diagnosis of a set of 53 micro-enterprises financed, selected jointly with Banco do Nordeste. In order to provide a permanent solution to the problem of system failure resulting from lack of replacement parts, a micro-credit fund was implemented, named FLUZ - Fundo de Sustentabilidade do Projeto Luz do Sol. To date, the fund has made possible the acquisition of 223 new batteries for refurbishing the faulty systems at the enterprises revitalized. For more details, see section III.

v) Productive uses of Renewable Energy

It gradually became clear to the Consortium that productive uses of renewable energy would play a central role in the sustainability of activities carried out under the program. In response, a series of productive pilot projects were developed, as highlighted below.

¹⁷ <http://www.cerpch.efei.br>

➤ *Solar Powered Micro-Irrigation for Organic Produce*

Two organic agriculture initiatives with micro-irrigation powered by PV systems were started under BCEEP. APAEB implemented a rainwater collection and drip micro-irrigation system in the community of Cabochard, in Valente, Bahia. The underground reservoir with storage capacity of 360,000 liters is a cost-effective means of storing the scarce rain that falls in the semi-arid regions, offering a sensible alternative to conventional, more expensive wells. The system irrigates an organic vegetable garden that produces food and income generation for local communities, employing 13 local youths.

IDER and NEPA (Núcleo de Ensino e Pesquisa Aplicada) jointly installed a water pumping and irrigation PV systems. The British Embassy leveraged a total of US\$ 18,200 for the equipment and technical assistance.

➤ *PV-powered ice factory*

IDER developed a solar-powered ice factory in a fishing community in Ceará, in cooperation with DEG (Deutsche Entwicklungsgesellschaft) and Würth Solar of Brazil, with a total capacity of 5kWp and investment of US\$50,000. Communities members were trained to operate the equipment and a revolving fund was set up to cover the O&M costs. However, the proximity to the ocean, which results in high salinity in the air, has proven to be a serious technical challenge, damaging the inverter and cabling and preventing, up to the moment, the continuous operation of the system. Full story is available in section III.

➤ *Solar Drying of Marine Algae*

The first project for solar drying of seaweed in Brazil, which started as a research initiative sponsored by the United Nations, began its pilot implementation with BCEEP's support. The cultivation, drying and commercialization of marine algae is making a difference in the lives of 23 families in the communities of Flecheiras and Guajiru. With this new economic activity, the families expect to generate an income of R\$ 150 per month, which represents a possible increase of 100%. The product is being sold to the food, cosmetics and pharmacy industries. In addition to being a source of income for the local population, the activity has other positive impacts. Seaweed cultivation has been proven to enhance the natural environment, providing a microhabitat for the reproduction of the fish, lobsters and shrimps, which have become scarce in the region. At the same time, the social environment has also benefited, as the importance of the role of women in the activity has tipped the gender balance favorably. In order to encourage and orient this process, the NGO Terramar is assisting women in empowerment leadership abilities. Full story is available in section III.

➤ *Solar Drying of Fruits*

Winrock installed a solar drier of fruits at the Cooperuna cooperative in Ilhéus, BA, with the objective of adding value to the fruits produced in the region, as well as to determine how solar drying compares, in cost, quality and speed, with conventional electric dryers. Six months' experience has pointed to the need of adapting the drier to operate with a back-up heating system necessary in this region of high humidity. A technical consultant was identified to assist in the effort. Winrock and IESB are working together to raise funds for this project through SEBRAE.

➤ *Solar Drying of Pollen*

The American company AGUASOL has been cooperating with Eco-Engenho team to design and install a sophisticated solar dryer for pollen. Solar dryers found in Brazil are suitable for less complex applications such as drying of fruits, but are not fitted with the temperature control devices and back-

up heating required in dehydrating pollen. Eco-Engenho initiated the construction of the pilot solar dryer during BCEEP.

➤ *Energy Generation from Biomass at Bandeira Ceramic*

The Bandeira Ceramic biomass project was successfully supported by Eco-Engenho throughout its development. The cooperative recently received approval for a loan of US\$ 144K by E&Co to implement the project, which consists of a 99 hectare energy forest to supply the ceramic ovens with fuel, making the industry self-sustainable in this regard. Read full story in section III.

vi) Projects not financed yet: Open opportunities for BCEEP Impacts in the Future

➤ *Biomass projects*

Although BCEEP extensively supported the Pindorama sugarcane Cooperative in Alagoas by carrying out the technical, economic and financial analysis of the generation of excess electric power and interacting with stakeholders, the program was unable to secure the financing to implement the project. The president of the cooperative had several meetings with financiers interested in the cogeneration project and showed its interest by signing a confidentiality agreement with Eco-Engenho. However, he showed hesitance in signing a loan contract before PROINFA was regulated and the environmental license acquired. Eco-Engenho is still working with Pindorama Cooperative to overcome all these barriers.

In terms of rural biodigestion, Winrock strengthened ties with SEAGRI and CRA, with the common goal of developing biodigestion projects in the livestock industry sector. A cooperative agreement was signed with Williams Engineering Associates (WEA) to provide technical assistance on biodigestion feasibility studies and projects. These and other biomass projects to generate electricity with feasibility studies sponsored by BCEEP and its partners were not financed yet. Pushing these projects to financing stage would require further support to entrepreneurs.

➤ *Wind Farms*

IDER carried out negotiations to implement several private wind power enterprises. In total, IDER lent technical assistance to three private enterprises in developing wind power projects, totaling over US\$55.4 million. The projects had a long waiting for authorization by ANEEL with several setbacks. The Federal Government transition in the last year of the program and changes in market regulation made it impossible to finish negotiations during BCEEP. The investor, SIIF, was still waiting for an official answer from ANEEL and the Brazilian Federal Government at the end of BCEEP. New investments in Wind Farms for sale of energy are not likely to happen before the economic value for PROINFA has not been defined.

➤ *Sustainable forest management*

After defining the project and obtaining a favorable regulatory ruling regarding the use of the CCC, the support of INEE to a project to use sawmill residues (linked to sustainable forest management) in the Amazon was stopped due to the budget restrictions. The potentially interested investors identified remain interested but all decisions are on hold until there is more clarification of the government's policies. The Global Environmental Fund solicited a proposal for the pilot that is hoped to be the first of a series of projects to be developed for financing. The project has an estimated cost of R\$ 10 million.

➤ *Outcomes of Negotiations with investors and banks*

BCEEP

USAID / Brazil Clean and Efficient Energy Program

During the program, IDER and Eco-Engenho discussed with E&Co/B-REED the financing of six projects in several stages. The Bandeira Ceramic biomass project, assisted by Eco-Engenho, was approved by E&Co. The project “Operárias do Mel” for drying of pollen is being considered as the next project to be financed in Alagoas. In Ceará, IDER discussed the expansion of the solar-irrigated organic agriculture and solar drying of seaweed initiatives, as well as a wind farm and a castor oil plant biomass project, started the Enterprise Development Services, and the business plan development for each project. A second Organic Agriculture Project in Ceará has begun, with water pump equipment donated by the German Embassy.

Negotiations with Banco do Nordeste started under BCEEP led to the negotiation of a Protocol Agreement with IDER and E&Co/B-REED in 2003 to identify projects with market-based productive uses of renewable energy to be financed under a *green fund* (“FNE Verde”). This work will continue after BCEEP.

International Technology Cooperation

WI Brazil and its partners lent their support to several U.S. companies interested in doing business in Brazil. The cooperation between American and Brazilian organizations was achieved through eight initiatives established, which led to the development of 10 international cooperation projects. Three initiatives in technology supply (Monitoring and Verification, cogeneration technology and small solar drier technology), two initiatives in PV equipment supply, two initiatives to implement B-REED and one initiative to finance RE applications were carried out, as detailed in the following paragraphs:

1. Cooperation Econergy -INEE in Monitoring and Verification in EE(leading to 1 project)

The cooperation initiative between INEE and EIC was consolidated in 2002, aiming at the capacity development of INEE in Protocols for Monitoring and Verification (M&V) in energy efficiency projects. Econergy developed and carried out M& V training. A complete building energy monitoring and diagnostic system was delivered to INEE. Several sites were selected to test the equipment, including hands-on training and testing. Equipment operation, software use, and design and implementation of a complete diagnostic monitoring plan were the key topics to be covered. A pilot project was carried out at the Ibmc building, in Rio de Janeiro.

2. Cooperation E&CO-Eco Engenho to carry out B-REED in Alagoas (leading to 2 projects)

3. Cooperation E&CO-Ider to carry out B-REED in Ceará

Through BCEEP’s institutional support, Eco-Engenho and Ider were able to broaden their scopes of work, launching successful partnerships with E&Co from the US to implement B-REED (Brazil Renewable/Rural Energy Enterprise Development) in Alagoas and Ceará, respectively. Through this effort the REED methodology, which was successfully used in Africa (AREED) and Central America (FENERCA), was made available to Brazilian companies. Both institutions provided enterprise development services to a pipeline of projects to be financed under BREED. These projects include: one organic agriculture project, one drying of seaweeds project, a Wind Farm and a biomass project in Ceará, which had the business plan development started as well as the discussions with E&Co regarding financing conditions. In Alagoas, Eco-Engenho provided support to a biomass project (for the Bandeira Ceramic industry) and a project of drying of pollen (for the company Operárias do Mel). These two projects, for which the business plan developments were finished, were counted under cooperation projects. Bandeira Ceramic already successfully raised financing from E&Co.

4. Winrock and Banco do Povo pilot p project to finance solar systems.

The micro-credit institution Banco do Povo was chosen by Winrock to participate in the visit to Sri Lanka to learn about the financing methodology and solar technology successfully employed there. With technical support from Winrock International and financial support from BCEEP, Banco do Povo carried out a pilot project in micro-credit for financing solar home systems and lanterns in its area of reach in 2003.

5. Cooperation NREL-Vibhava on cogeneration technologies (leading to **1 project**)

The cooperation initiative between NREL and Vibhava was centered on cogeneration technologies and the Brazilian market. Vibhava received financial support and technical orientation from NREL, while NREL learned about the developments in cogeneration in Brazil. This initiative led to the 1 sugar mill project described in BCEEP Annual Report FY2002.

6. BP Solar-IDER and UNIFACS¹⁸ cooperation to install SHS and implement a revolving fund for system maintenance (leading to **4 projects**).

BP Solar worked in partnership with IDER (in Ceará – 2 communities) and UNIFACS (in Bahia – 2 communities) to install PV home systems and implement a revolving fund for system maintenance. There was joint definition of sustainable management models between Brazilian institutions (UNIFACS and IDER) and BP Solar, and earlier Winrock's involvement.

7. Agreement between Eco-Engenho and Aguasol to build a small demonstration project of a solar drier (leading to **1 project**)

A Memorandum of Understanding (MOU) to transfer clean energy technology to Brazil was signed between Aguasol, a private company based in California, and Eco-Engenho. Together, they are seeking resources to build a strong in-country support effort for technology cooperation and collaborating in developing of appropriate technology suitable for rural areas in Brazil, especially low cost technology. The development of an advanced solar dryer has started. The solar dryer will be installed at a community in the Municipality of Coruripe in partnership with the Operárias do Mel company which is also receiving support from B-REED.

8. Cooperation Unisolar – Banco do Povo in the supply of solar equipment (solar home systems and lanterns) for micro-credit financing (leading to **1 project**).

After a successful launch of the solar lantern micro-financing program, Banco do Povo ordered sixty (60) units to the US supplier Unisolar, consolidating this technology cooperation initiative, which initially aimed at financing solar home systems.

➤ *Other initiatives started under BCEEP and expected to have outcomes soon*

In the cooperation between IDER and the Washington Liaison Office – USA to implement a RESCO in Brazil, the business plan is ready, a cooperative agreement is under review to be signed soon and the business plan has been presented to financiers. In the cooperation between CERPCH and the U.S. manufacturer Gorlov Turbines to develop hydrokinetics turbines in Brazil, a letter of intentions from a Brazilian industry was signed demonstrating its interest in using the technology in Brazil.

Cross-Cutting Activities

¹⁸ For FY2002 this is being counted as 3 projects (1 community in CE and 2 community in BA). The cooperation initiative and 1 of the 4 projects were counted in FY 2001.

Information Dissemination

BCEEP aggressively used the internet as a medium to disseminate information on ongoing activities, publications and news in general. The websites of ABESCO, RENOVE and Winrock Brazil were improved. Electronic reports on small hydro power plants news were developed and distributed twice a month for the 6,000 people registered at CERPCH’s site. Over 20,000 visits were registered to BCEEP -related information online. Monthly e-bulletins were distributed to BCEEP members, offering a quick and inviting means of keeping update with the successes and advances of the group.

Over 39,000 printed copies of publications and magazines were broadly distributed to subscribers and key actors in Brazil and the U.S.¹⁹

Small Grants Award Program

Over the course of the program, twenty small grants were approved, totaling US\$ 42,835. Eight grants allowed the beneficiaries to participate in key events and trainings related to RE/EE. Four grants were used to sponsor a series of RE/EE workshops, conferences and contests. One grant was for the development of the Internet project for disseminating the capacity building experience of at-risk youth, through IDER. Two pilot market-driven solar dryer projects in Bahia and Ceará were developed with resources from the Small Grants Program. Two other grants were approved for an energy efficiency initiative.

A specific RENOVE’s Award supported three innovative experiences by members of the network, with \$2,667 each.

Table 5. Grants awarded

FY 2003	
Applicant:	PESACRE
Value:	US\$ 2,667
Project Name:	RENOVE Award
Description:	The RENOVE Award (Renewable Energy and Sustainable Development Award) has as its objective to register success stories where the contribution of Third Sector Organizations that work with renewable energy to the development of the Brazilian Society is highlighted.
Applicant:	APAEB
Value:	US\$ 2,667
Project Name:	RENOVE Award
Description:	Same as above.
Applicant:	IDER
Value:	US\$ 2,667
Project Name:	RENOVE Award
Description:	Same as above.
Applicant:	PESACRE

¹⁹ 8 editions of SHP-News Magazine of 4,500 copies each and 450 copies of the Trade Guide on Renewable Energy in Brazil, 3,000 copies of books of the series *Energia: Novos Cenários*; several copies of a book on *Universal Electrification and its legal, technological, social and economic aspects*, and the translation of the *Power Guide – An International Catalogue of Small-Scale Energy Equipment* collection.

BCEEP
USAID / Brazil Clean and Efficient Energy Program

FY 2003	
Value:	US\$ 715
Project Name:	Support to participation of RENOVE's meeting
Description:	Support to send one representative of PESACRE to RENOVE's meeting held in Brasilia on September 17-18, 2003
Applicant:	IDEAAS
Value:	US\$ 2,024
Project Name:	Support to bring members to participate of RENOVE's meeting
Description:	Support to bring representatives of APAEB, Ondazul, Jupará, IESB, NEPA, Instituto Hórus, Sociedade do Sol e PSA to RENOVE's meeting held in Brasília on September 17-18, 2003
Applicant:	ANEELCA/Gilma Passos Rocha
Value:	US\$ 3,010
Project Name:	Support to participate of Powergen International Conference
Description:	The Subcontractor will participate in the Powergen International Conference from December 7th to December 11th at the Las Vegas Convention Center – Las Vegas – USA.
Applicant:	IBMEC/Nelson Albuquerque
Value:	US\$ 1,953
Project Name:	Technical visit – exchange with US ESCOs
Description:	Mr. Albuquerque will visit four American ESCOs that apply Performance Contract Mechanism and the American ESCO Association to identify possible problems and solutions for the implementation in Brazil of financial mechanisms for companies.
Applicant:	IBMEC/Carlos Eugenio Seiblitz Filho
Value:	US\$ 1,953
Project Name:	Technical visit – exchange with US ESCOs
Description:	Mr. Seiblitz will visit four American ESCOs that apply Performance Contract Mechanism and the American ESCO Association to identify possible problems and solutions for the implementation in Brazil of financial mechanisms for companies.
Applicant:	CENA/USP
Value:	US\$ 1,094
Project Name:	Support participation in international workshop
Description:	A speaker from CENA/USP will present the lecture "Impact of climate change on NPP (Net Primary Production) and agronomic production in different regions of Brazil" at the workshop "Climate change, Carbon Dynamics and World Food Security"
Applicant:	CERPCH
Value:	US\$ 1,000
Project Name:	Award "USAID/Winrock" to the best paper presented in the "X Encontro Latino Americano e do Caribe em pequenos aproveitamentos Hidroenergeticos" (X ELPAH)
Description:	Contest to stimulate young researchers to develop new SHPs/MSPs projects. The award will be in the amount of US\$ 1,000.
Applicant:	COOPERUNA
Value:	US\$ 3,200
Project Name:	Solar Energy Dryer
Description:	Implementation of a pilot-project to dehydrate tropical fruits, based on the use of solar energy, capacity building of small income agricultural families in the production dehydrated tropical fruits, integrated to the process of organic certification.
Applicant:	IDER
Value:	US\$ 3,245
Project Name:	Solar Energy Dryer
Description:	Implementation of a pilot-project to dehydrate kelp, based on the use of solar energy. The solar dryer was installed on a fisherman community and the local people will be capacitated. The project is being implemented in partnership with the local NGO TERRAMAR.
Applicant:	Instituto Ecologica
Value:	US\$ 1,650
Project Name:	Support to participation of meetings with USAID and World Bank

BCEEP
USAID / Brazil Clean and Efficient Energy Program

FY 2003	
Name:	Participation of meetings with USAID and World Bank regarding to Prototype Carbon Fund,
Description:	Biofund and Community Carbon Fund during the period between February 21 and 27, 2003.
FY 2002	
Applicant:	CERPCH/Augusto Nelson Carvalho Viana
Value:	US\$ 1.400
Project Name:	“IX Encuentro Latinoamericano del Caribe sobre Pequeños Aprovechamientos Hidroenergeticos”
Description:	Participation in the above meeting to take place in the city of Neuquem, Argentina from November 5th to 9th, 2001. The objective of this activity is to present a section on the feasibility of installing a 70 kW hydropower plant in a rural property in the County of Delfim Moreira in southern Minas Gerais.
Applicant:	AF Engenharia/Patrick Fontoura
Value:	US\$ 1.996
Project Name:	29 th Photovoltaic Specialists Conference
Description:	Mr. Fontoura participated of the 29 th Photovoltaic Specialists Conference, held by IEE– Institute of Electrical and Electronic Engineers at New Orleans – USA, during May 24-29, 2002. Besides the conference, technical visits to Southwest Technology Development Institute – SWTDI, Photovoltaic Star Facility, Arizona State University Photovoltaic Testing Laboratory, National Renewable Energy Laboratory and Sandia National Laboratories will be made.
Applicant:	Instituto Ecologica
Value:	US\$ 3.000
Project Name:	COP 8
Description:	Mr. Divaldo Rezende participated of the Conference of the Parties of the Kyoto Protocol – Eighth Session, held in New Delhi, India, on October 2002.
Applicant:	IDER
Value:	US\$ 1,754
Project Name:	Internet for young people
Description:	IDER developed a project to empower, register, systematize and disseminate the experience of capacity building of young people at risk situation, within the area of renewable energy, environment, through the resources of information technology and Internet.
FY 2001	
Applicant:	Itajubá Federal School of Engineering/Eduardo Vasconcelos
Value:	US\$ 1,999
Project name:	Electric generation using gaseous biomass as fuel.
Description:	Participation in the biomass usage international training in the India Institute of Science, in Bangalore, from April 09 to 22, 2001.
Applicant:	Instituto Ecológica/Divaldo Rezende
Value:	R\$ 6,900
Project name:	“Sustainable Energy for Sustainable Business in the Amazon” Workshop
Description:	Holding a workshop from August 22 to 24 of this year. The venue will be the Canguçu Research Center in Pium municipality, near Bananal Island in the state of Tocantins, Brazil. The workshop’s agenda includes approaches to providing sustainable energy service to people who lack that basic utility in the Amazon region. Guests will include members of a wide range of institutions engaged in projects related to the sustainable generation of energy. The workshop’s organizers include the World Bank, AES Tietê, USAID and TNC, with the support of the State of Tocantins, MCT, MMA and CELTINS Network. Representatives of ANEEL, A2R and PRODEEM, among others, will participate.
Applicant:	Fundação Luís Eduardo Magalhães/Sander Scoofield
Value:	US\$ 2,000
Project name:	Series of Conferences “Energia: Novos Cenários”
Description:	Carry out a series of three conferences:

BCEEP

USAID / Brazil Clean and Efficient Energy Program

FY 2001

Description:

- Outlook for Rural Areas, October 4th, 2001
- Outlook for Urban Areas, November 13th, 2001
- Future Scenarios: Renewable Energy, December 13th, 2001

The objective of these conferences is to mobilize the sectors involved in developing solutions through new energy alternatives and to share success stories concerning the use of renewable/efficient energy. By bringing together governmental institutions, academia, and the private sectors for discussion and debate on technological solutions for the power sector, the hope is that an on-going forum for communication within the state of Bahia will be created. FLEM committed to deliver a report on the event with copies of presentations, list of participants, synthesis of discussions and recommendations.



Section III – Success Stories and Lessons Learned

A selection of BCEEP’s most compelling achievements and experiences are presented in detail in this section. These short histories are intended to highlight those initiatives that, through both their triumphs and their difficulties, are sure to have a lasting effect on the future of clean energy in Brazil and on the people that harness this power. The cases shown in this section were chosen by Winrock, based on its own perception of the impact and relevance of each, compiled after consulting with the consortium members on the information reported. For further insight into the stories, please check the accompanying CD ROM #1, which contains photo records of many of such experiences.

Success Stories

RENOVE: an NGO Network success case

RENOVE is the most pure example of how BCEEP actions can result in public policy development. Having celebrating its third anniversary, RENOVE is recognized by the energy commission of the Congress and by several ministries as an active player in the field of renewable energy in Brazil, and has been invited to participate in strategic decisions and public policy development. This is unequivocal proof of the success achieved by RENOVE, which also plays a major role in the promotion of information exchange among its members. Over the past three years, RENOVE evolved from a concept to a legally established institution, led by an active board and equipped with a sustainability/strategy plan prepared by its executive secretary. In summary, a complete cycle was achieved by BCEEP, beginning with the strengthening of key NGOs, passing through the establishment of the network, and culminating with the effective participation of the network in the development of RE policy.

RENOVE's Birth: A joint effort between Winrock International Brazil Office, through the REPSO and USAID Brazil Energy Program, succeeded in bringing together eighteen Non-Governmental Organizations on July 16th and 17th, 2000 at Praia do Forte Eco Resort, in the state of Bahia, (NGO) to establish the RENOVE -*Rede Nacional de Organizações da Sociedade Civil para Energias Renováveis* (National Network of Civil Organization for Renewable Energy). This initiative contributed to the achievement of one of the BCEEP's main objectives - to formalize and strengthen a key actor to increase the use and production of clean and efficient energy in Brazil.

RENOVE's Members: Since its startup in 2000, RENOVE has steadily grown, and now joins 30 Brazilian NGOs engaged in rural development, specifically in essential activities such as energy, health, education, management and natural resources preservation, eco-tourism, fishing, fruit drying, craftwork, gender, capacity building, leadership and human development and others. These NGOs are carrying out sound programs in rural zones, including environmental protection areas in the Amazon region in northern Brazil, stretches of the Atlantic Tropical Forest along the eastern coast, as well as in the central region of the country.

RENOVE's objective is to aggregate the individual strengths and experience of members towards incrementing the use of renewable energy (RE) and disseminating information among network members and to new partners – private and public sector and other NGOs. Furthermore, RENOVE unites its members in a single and stronger voice to advocate the role of renewable energy in the improvement of the quality of life for rural populations. By providing training and capacity building; supporting the formulation of public policies for RE use, providing technical assistance and disseminating findings, lessons learned and results, identifying credit lines for RE and supporting fund-raising for sustainable social and economic projects for productive uses of RE, RENOVE is an important player in the campaign to further the role of renewable energy in rural development in Brazil.

The establishment of RENOVE coincided with a very special moment for RE in Brazil. For the first time, at least at the political and institutional level, RE was being considered as an alternative to diversify the national energy matrix and to supply power to remote, off-grid localities in a cost-effective way. A series of regulatory mechanisms were being proposed to improve non-conventional RE technologies competitiveness, and several are already in place. RENOVE is an ideal means of providing sound input to the policy and decision-making process, assisting key political actors, provoking discussions and revising draft legislation, and providing valuable feedback.

BCEEP

USAID / Brazil Clean and Efficient Energy Program

In the last year of BCEEP, the design of a comprehensive action plan culminated in the creation of 3 task forces for policy promotion, capacity building and fund raising. RENOVE worked closely public authorities, such as Congressmen and representatives of ANEEL, MME, MCT, MMA/IBAMA/CNPT, ELETRONORTE and PNUD, among others. The network contributed to the proposal for the creation of a Special Sub-commission on Renewable Energy, under the Mines and Energy Commission of the House of Representatives. RENOVE also supported MME and other members of the Brazilian Delegation in the preparation of the regional action plan for Brazil for GVEP. After BCEEP, the network is viewed as an important forum and voice of RE NGOs, prepared to provide valuable input on regulatory and technical issues. RENOVE will enter next year with a positive perspective of close collaboration with public and private authorities and a portfolio of successful initiatives to be expanded and replicated.

Renewable Energy in Alvorada Municipalities

In 2001, the Brazilian Federal Government created the Alvorada Project, an umbrella under which the Government channeled actions through 14 federal poverty alleviation programs to those municipalities with low human development indices (HDI below 0.5). Winrock was selected to set up 73 of the 130 Portals established in the state of Bahia, from 2001 to 2003. Alvorada Portals were designed to be information outposts, equipped with full-time staff, computers, audio and visual equipment and informative material on target areas such as health, education, sanitation and energy.

With support from BCEEP, Winrock promoted an extensive information dissemination campaign of renewable energy, which was implemented in three ways:

**52 schools electrified
with renewable energy
in Bahia**

(1) Presentations on the use of renewable energy to portal coordinators during three Regional Seminars; (2) development of RE “kits” with basic educational content and delivery of such kits to all 73 portals; and (3) support to the development of a study on the impacts of the lack of electricity on the lives of families and, especially, women.

The purpose of the Energy Kit was to present to the local population, in an accessible, captivating format, the benefits that renewable energy can offer to rural communities.

- A CD-Rom developed by The National Reference Center for Wind and Solar Power - CRESESB, presenting an introduction to solar and Wind technologies, in its current state of development and applications in Brazil, including some information about The National State and Municipality Energy Development Program - PRODEEM;
- The video *Solar Energy in Rural Schools*, developed by *Projeto Saúde e Alegria –PSA* on the installation of PV systems in rural schools for lighting and use of equipment such as TV, video and refrigerators;
- Two brochures on renewable energy developed by The Association of Small Farmers of Bahia (APAEB). The first *Energia Solar: um raio de sol em sua vida* presented, in a simple way, different uses of solar energy. The second, on electric fences, presented the installation process and equipment needed to build such solar powered fences as a more economic alternative to conventional fences.
- The first issue of *The Power Guide*, published by Winrock and CRESESB, from the English publication *Power Guide – an international catalogue of small-scale energy equipment*.

Through those publications, presentations and follow-up work with individual Portals, Winrock passed on important technical and economic information on renewable energy, including financing and business opportunities. Motivated by this effort, the Alvorada Portals carried out a survey of energy needs of their rural schools, and Winrock subsequently succeeded in obtaining PRODEEM funds for PV Electrification of 52 Schools within the Alvorada Municipalities.

Biritinga, one of the most successful Portals, was visited by USAID Brazil Mission representatives, who were able to witness several accomplishments of the Portal, such as: 120 young students trained in Information and Communication Technology (ICT) at the computer center created within the Portal; a community garden in the backyard of the Portal office attending two schools and one nursery; and active participation of volunteers and local government. The Mayor and Secretary of Agriculture met with USAID, which donated two additional computers to the school and provided RE training to three portal coordinators of the communities Barreiras, Serrinha and Ribeira do Pombal.

BCEEP

USAID / Brazil Clean and Efficient Energy Program

Winrock also promoted waste management initiatives at and the Portals. Four waste recycling projects for Alvorada municipalities were submitted to the Bahia State the Poverty Alleviation Secretary and Mayors of the Municipalities.

Of the 73 Portals initially set up, nine have reached sustainability and started to operate with their own resources after the Federal Program was discontinued, in February of 2003. The future of the remaining Portals still depends on the new Federal Government's position.

Productive solar drying of seaweed

According to research carried out by the United Nations, the coast of the states of Ceara, Paraiba and Rio Grande do Norte was found to be suitable for the growing of marine algae, with over 300 species identified. The market opportunity for this product is promising: Brazil imports 20 million kilos of marine algae a year, producing only 10% of the local consumption. Each ton of marine algae turns into 100kg of agar, a refined powder for the food industry, used in dairy products, such as ice creams and yogurts, in several sweets, in canned meat products, in drinks, such as beers and wines, and in bakery in general. In the 70s, non-sustainable extraction significantly reduced the quantity of algae available. The UN research concluded that the predatory activity could be substituted by sustainable cultivation, revitalizing the production.

In 2003, IDER led the first project for solar drying of seaweed in Brazil, which began its pilot implementation with BCEEP's support. The growing, drying and commercialization of marine algae is making a difference in the lives of 23 families in the communities of Flecheiras and Guajiru. With the new

100% increase in the income of local families

economic activity, the families expect to generate an income of R\$ 150 per month, which represents an increase of 100% in the income. Seaweed is being sold to the food, cosmetics and pharmacy industries. In addition to being a source of income for the local population, the activity also has other positive impacts. Seaweed cultivation has been proven to enhance the natural

environment, providing a microhabitat for the reproduction of the fish, lobsters and shrimps, which have become scarce in the region. At the same time, the social environment has also benefited, as the importance of the role of women in the production and commercialization chain has tipped the gender balance favorably. In order to encourage and orient this process, the NGO Terramar is assisting women in empowerment and leadership abilities.

The project, which uses solar energy to dehydrate marine algae, was implemented in partnership with the local NGO Terramar. The major advantage of the solar technology is the price: the solar dryer costs R\$ 3,500 (US\$ 1,170), much less than the conventional electric dryer, which is sold at R\$ 11,000 (US\$ 3,670). The time to dry the seaweed was reduced from one day to about three hours, with the solar dryer. With the solar drier, the quality of the final product is improved, as well as the sale price.

Solar dryer: faster drying and better quality, at a third of the price of a conventional electric dryer.

Women are the main protagonists of this project. Local community members were trained in seaweed processing techniques and started to install the underwater structures used in the seaweed cultivation. IDER installed the solar drier and provided a training course on maintenance to 15 members of the local association. During the last months of BCEEP, as the initiative proved successful, the producers requested assistance to raise more funds to acquire additional solar driers. IDER is providing Enterprise Development Services to entrepreneurs, through B-REED, and working towards developing a business plan for the project.

In the future, IDER intends to improve some issues, such as use of the underwater structures, and expand the pilot project with support of investors such as E&Co and local development banks.

Renewable Energy Training and Job Opportunities for At-Risk Youths

BCEEP achieved important results in the social context, working with at-risk youths to improve their skills, professional potential and employment opportunities. The first course on renewable energy for the rural sector, jointly organized and ministered with POMMAR-GACC, was completed in July 2002. In total, 27 participants from 17 to 20 years old were trained. In addition to the classes, students visited an ice factory, a wind turbine and factory and a wind power farm. The objective of this initiative was to pass on the technical skills to socially disadvantaged adolescents, who can play a fundamental role in the sustainability of future RE projects in rural Ceará. In fact, 10 of the participants were immediately employed in the market, working in the area of PV installation and maintenance. At the end of BCEEP, 17 at-risk youth trained by IDER are employed and five others are negotiating employment opportunities.

IDER also carried out a study on employment opportunities in the renewable energy market, which concluded that although still small, the RE market is growing fast in Ceará and will be consolidated in the next five years, due to factors such as the power crisis and the favorable public regulation. Nine operating companies were identified, totaling 415 direct job positions, in which the average wage for technicians was R\$ 1.300,00. Fifty-eight wind, hydropower and thermoelectric power plants in operation and authorized in Brazil were mapped.

- ✓ 27 at-risk youths trained
- ✓ 17 currently employed
- ✓ 5 negotiating employment opportunities

A step toward validating the training step was taken when IDER's training course in renewable energy was certified by Federal Technical Center - CEFET. This certification helps overcome an important cultural barrier, the belief that only schools and universities can provide quality professional courses. IDER is the first NGO certified by CEFET in the northeast. This training initiative will continue in the next years, driven by market demands that generate employment opportunities. In future courses, Internet and web based resources are expected to become a more important component of the learning tools.

Financing the Energy forest of Bandeira Ceramic Industry

In the Municipality of Flexeiras, State of Alagoas, the Bandeira Ceramic uses biomass to dry and burn around 2 million ceramic pieces per month, consisting of 3,500 tons of clay. The biomass used is bamboo and eucalyptus wood. Although bamboo is available locally, eucalyptus was brought from the state of Bahia, increasing the industry's operational costs. The monthly consumption was 1035 m³ of bamboo and 661.5 m³ of wood. Many ceramic industries in the state have failed, in part due to their inability to recover the high costs of the fuel, responsible, on average for the 12% of total cost of production.

Instituto Eco-Engenho, with support from BCEEP, carried out a technical study to determine the requirements for a sustainable energy forest in the region, which would supply biomass for the ceramic factory. The project proved timely, as the industry was in the process of expanding its production. The project was intended to be a model pilot project, which would prove the feasibility of the use of similar technologies to other ceramic industries in Brazil.

The project was approved by E&Co/B-REED, for a loan of US\$ 144K. With this investment, an area of 99 ha will be planted with eucalyptus, sufficient to make the factory self-sustainable in terms of fuel. With the energy forest, the industry expects to save approximately US\$ 20,000 a year, during the first three years, and a total of US\$ 100k in four years. The contract, which was the first investment of E&Co/B-REED in Brazil, was extensively discussed with the client for several months. Loan disbursement is expected to occur at the end of the BCEEP Program. It is important to highlight that this effort linked international funds to local entrepreneurs.

Eco-Engenho also supported Cerâmica Bandeira in seeking for co-investment from Bank of Northeast, which will provide a loan of R\$ 1 million (US\$ 334,000) to be invested in a tile manufacturing line, with the objective of strengthening the company.

The project is expected to be replicated naturally, since it provides an important solution to a problem that the local ceramic industry faces. One of the owners of Bandeira Ceramic industry is also president of the Ceramic Industry Association and thus other entrepreneurs are likely to follow his initiative. It is also expected that other banks will more easily approve future similar investments once this pilot was financed by E&Co and proved successful.

Following up on this initiative will be crucial to better understand the real variables that RE entrepreneurs face when investing, especially when international capital is at stake.

Energy Efficiency Financial Task Force

Another front started by BCEEP in the energy efficiency area was contributing to the development of a Financial Task Force (FTF) for Energy Efficiency Projects. It has long been recognized that third party financing is a key bottleneck to expanding the commercialization of energy efficiency projects in Brazil. The task force started with participation of key institutions in the field, such as the National Institute for Energy Efficiency (INEE) - a NGO that has been involved with EE and cogeneration for over 8 years and has close to 90 associates from the energy sector, industry, government and research centers -, Econergy International Corp. (EIC) - a technical, financial and economic consulting firm composed by a multinational team that serves clients such as fund managers in the energy and environment industries, internationally experienced in addressing renewable energy and efficiency project financing difficulties and structures -, the International Institute for Energy Conservation (IIEC) - a US NGO working to promote industrial and commercial EE projects and develop models for financing -, and the Brazilian Association of Energy Services Companies (ABESCO). The Task Force also has the participation of Febraban (the Brazilian bankers' association), BNDES, PROCEL, state industrial federations and other stakeholders.

The FTF was established informally in January 2001 at a meeting in Rio de Janeiro sponsored by IIEC with funding from the Moriah Foundation. It has sought since its beginning to encourage a dialogue between key players in this market: energy efficiency service providers (ESCOs), financial agents, consumers and government. This dialogue was crucial to familiarize the players' of each others' perspectives and needs and to define the measures needed to break the impasse in third party financing.

Since 2001, the FTF was supported by USAID/BCEEP. In October 2001, the World Bank began specific preparations to support the FTF in the context of a broader program involving Brazil, India and China, adding substantial prestige and potential resources for the FTF. However, the effective release of World Bank funds did not begin until March 2003.

The FTF advanced along three broad lines of work with BCEEP resources, to address the major bottlenecks for financing EE projects: (1) the design of financial intermediation mechanisms; (2) instruments for the financial analysis of projects; and (3) developing the basis to bring quality efficiency projects for financing.

With regard to financial intermediation mechanisms, the initial emphasis was on developing a Guarantee Fund to cover medium term bank credit. This was made explicit by the Brazilian delegation at the World Bank meeting in India in January 2002. Econergy and INEE analyzed the design issues for a Guarantee Fund for ESCO projects with BCEEP resources and presented them at a seminar on August 16, 2002. The concept of a Guarantee Fund is controversial in the Brazilian financial community. It had been rejected for years by the Ministry of Finance, but was accepted in principle in mid-2002.

The work by Econergy and INEE argued that while a Guarantee Fund is clearly a key ingredient for opening access to credit, it must be complemented by greater access to equity or "risk" capital. This line of parallel development has been maintained by Ibmecc in its work contracted by the World Bank since March 2003.

In terms of analysis tools, a financial model for evaluating projects with Performance Contracts, including income statements, balance sheets, and cash flow projections, was developed and distributed to stakeholders. The ESCO Finance Tool is a sophisticated modeling tool that enables a user to easily view an ESCO project from the customer, lender and equity investor perspective significantly aiding the ultimate financing of such projects. EIC provided a detailed list of risks and mapped possible financing sources.

With regard to the third line of work, USAID and BCEEP addressed issues related to adapting performance contracts to Brazilian conditions, including the presentation and discussion of alternative models of contracts, the verification of results and the arbitration of disputes.

INEE developed a first set of performance contract models with contributions from Econergy, published in late 2001. Two basic generic models (guaranteed performance and shared savings) were adapted to Brazilian jurisprudence and described, as well as two variants of the latter model (including one based on Chinese experience). The next phase of work was to describe the differences between the models (especially regarding the structure of financing and payments) and factors to consider in choosing between them. This involved both reports and seminars.

Performance contracting implied some kind of mutually agreed procedures between the ESCO and the client for verifying the results. With BCEEP support, INEE continued its work of adapting the International Performance Measurement and Verification Protocol (IPMVP). The latest edition of the Protocol was translated and preliminary case studies developed. The case studies established a basis to assist ESCOs and consumers on the use of measurement and verification not only for performance contracts but energy management more generally. INEE is establishing a “Forum of M&V” to more actively involve a wider group of interested professionals.

The FTF also came up with an alternative solution for the high cost and delays of the Brazilian judicial system’s customary mechanisms in dealing with contract conflicts that required specialized technical knowledge, by establishing a Chamber of Arbitration with capabilities for energy efficiency contracts. A four-week course on arbitration procedures in energy contracts was held at Ibmec in July-August, 2002 with 30 participants.

In March 2003, after many delays, the World Bank/UNF/UNEP mobilized resources of US\$130,000 for the Energy Efficiency Working Group during the following 12 months, under the coordination of Ibmec. Ibmec organized the First International Roundtable on Financing Energy Efficiency on April 2nd, attended by over 50 people, with significant participation by from the banking, private, and government sectors.

With this, the FTF entered a new phase. Under the new work plan, agreed with the World Bank two streams of activity are proceeding in parallel. The first stream (“Financing Mechanisms”) is the continued development, design and progress towards implementation of possible financing mechanisms for ESCOs, especially equity investment. The second stream (“Pilot Transactions”) seeks to close at least four financing transactions involving ESCOs or energy performance contracting by the end of 2003, through a contest. The BCEEP supported the Workshop on *Developing the Business of Performance Contracting* held August 19th to 20th that provided capacity building to more than 15 ESCOs interested in participating in the contest on performance contracts, measurement and verification of project results and business plan development. This Workshop was BCEEP’s last scheduled contribution to the FTF.

After the Workshop, it became apparent that ESCOs would need considerable assistance in taking projects to financing. The World Bank is preparing to add some resources in the short-term to support this process.

The efforts to develop mechanisms and models for actually financing energy efficiency projects pioneered under BCEEP will be continued in the next two years through the Energy Efficiency Working Group (as the Financial Task Force is now called) with World Bank/UNF/UNEP support. Other complimentary resources are being sought.

The Brazilian Association of Energy Service Companies

The increase of competitiveness among industries and the recent energy crisis in Brazil demanded more efficiency and lower operational costs than ever. Energy consumption was directly linked to this issue, playing an important role in the overall industrial process. BCEEP, realizing that the need to expand power generation could be minimized by the introduction of energy conservation and efficient use, identified and provided institutional support to a key player in the energy efficiency market, ABESCO.

The Brazilian Association of Energy Services Companies (ABESCO) was founded in 1997 with the finality of facilitating the aggregation of energy efficiency service companies (ESCOs) to develop the energy efficiency market in Brazil. With the support of BCEEP, ABESCO has been pursuing its goal by sponsoring and promoting the common objectives of its members, acting as a single voice for Brazilian ESCOs.

In the last three years, the support of Winrock International has allowed ABESCO to grow significantly in both number of associates and scope of actuation. Through a cooperation agreement with FIESP (São Paulo Industry Federation), ABESCO has been able to approach the industry, making the most of the opportunities brought about by the energy supply crisis. Regional offices were set up within the Industry Federation branches in seven states (MG, RJ, BA, SC, PR, RS and CE). ABESCO's presence was substantially strengthened and turned out to be an effective tool in developing 55 energy efficiency projects, with a corresponding total of investment of US\$ 7.24 M on the part of the private sector. Today ABESCO is hosted by FIESP and supported by National Industry Confederation (CNI).

At the policy level, ABESCO played an important role by developing a Program for Reduction of Electricity Consumption in the Industry, which resulted in the invitation to participate in the Brazilian Ministry of Mines and Energy's program for Revitalization of the Electric Sector.

The association has recently developed a model of the framework and criteria for ESCO accreditation, under a cooperation agreement with the National Program for Energy Conservation – PROCEL and with the support of BCEEP. The accreditation program, the first of its kind in the world, is a key concept to provide ESCOs with the required credibility and thus expand the energy efficiency market. ABESCO has been working together with ABNT, the Brazilian Association of Technical Standards, which created a quality workgroup and submitted the ESCO accreditation model for public hearing. It is expected that in the near future this initiative will serve as a benchmark for energy efficiency markets in other countries.

Additionally, BCEEP assisted ABESCO in implementing a new statute for the association, a plan for training and accreditation of ESCOs, and an improved web-site, adding information for consumers and other market agents. ABESCO has established partnerships with key stakeholders such as the American Chamber of Commerce, Universities and related Unions and Associations. Under the BCEEP Energy Efficiency Financing Task Force, ABESCO has been working to remove the barriers to financing of ESCOs.

The results achieved so far have proved that ABESCO is gradually turning into an Excellence Center for Energy Efficiency matters, acting as a service provider for the Sector in the areas of capacity building and information dissemination.

Improving quality of lives of women in the Amazon

Mamirauá Sustainable Development Institute is a non-governmental organization working in the Mamirauá Reserve, a flooded rainforest region, unique to the world. The NGO objective is to protect the *várzea*²⁰ at the confluence of the Solimões and Japurá rivers, near the city of Tefé, in the State of Amazonas, in the Northern Region of Brazil (see map). Environmental education, basic hygiene, rational use of natural resources, and sustainable economic development are some of the topics that are part of Mamirauá's agenda.



In the years of 2001 and 2002, Winrock Brazil led a project in the region to provide clean and accessible water and improved education with the use of solar PV systems. Eighteen riverside communities within a natural preservation area of unique flooded forestry in the Amazon benefited from this project, which installed photovoltaic (PV) powered water pumping systems and electrified community schools.

Using BCEEP funds, Winrock prepared the technical projects, obtained the PV solar panels as an investment in community development from the Brazilian Ministry of Mines and Energy and, together with Mamirauá, mobilized the communities to install, operate and maintain the energy systems. Community participation is a key factor to the success of such projects.

Winrock's role in the process was very important to overall project success. Winrock was responsible for the proposal preparation for the Tropic Humidity Program/MCT, and technological and training aspects of the project. Twenty-five local people were trained in operation and maintenance of PV solar and water pumping systems. The long-term sustainability is expected to be achieved by the creation of a revolving fund for operation and maintenance of systems.

Results include clean water and improved health conditions for hundreds of people in the reserve. Women, previously engaged in bringing water from the far-off river, now have more time available for other activities, including domestic and productive applications.

²⁰ *Várzea* is forest flooded every year by rivers rich in sediments and nutrients, and it may remain under water for more than four months each year

Increasing productivity and quality of life in Northeast Brazil

In the Semi-arid region of Bahia, as well as in most rural areas of the Northeast of Brazil, long dry periods limit agricultural production and hinder human and productive conditions, causing high rural exodus.

To increase productivity and improve living conditions, this was the goal proposed by Winrock and APAEB – the Bahia State Small Rural Producers Association, a not-for-profit institution based in the city of Valente, one of the most drought-stricken areas of the country, 250 kilometers from Salvador, the state capital.

BCEEP provided financial support for the design and construction of rainwater reservoir and PV-powered micro drip-irrigation system operating on 100-Watts panel and Shurflo water pump. Through the new irrigation system, rainwater is stored, pumped to elevated reservoir and flows by gravity. The underground reservoirs were designed to be more efficient than traditional reservoirs, capturing 361,000l (far above the regular 15,000l for common reservoirs). Local young people were trained on installation, operation and maintenance of the system, as well as in community organization, organic agriculture techniques and rural development planning, among other social issues critical to the successful outcome of this project. The Kellogs Foundation and APAEB leveraged US\$ 13,000 to the project.

These types of reservoirs for rainwater harvesting are being used for rural development projects in the region for many years now but none has incorporated PV power to productive uses. The community is benefiting from the availability of water for human and animal consumption and for irrigation in vegetable farming. Commercialization of vegetables has begun and is improving income of 40 families from Cabochard community. All work is done by young people that were mapped out by a study as the target audience for this project. This project is also contributing for the creation of jobs in the semi-arid region of Bahia.

Such initiatives will be able to be locally expanded through a revolving fund maintained by APAEB. A micro-credit line just launched by APAEB cooperative Bank – COOPERE will finance similar initiative at APAEB's influence area, some 18 municipalities in the semi-arid region. The financing scheme works in a manner that people pay for the equipment in a flexible way during 8 years, than becoming owners of the equipment. Included in the price, maintenance is guaranteed for 3 years after installation. BCEEP provided support to the implementation of a management software for the fund, as well as training in software operation. This initiative was taken in account under the *energia produtiva* program and will be replicated.

“The activities carried out in this project fill with hope the hearts of youth that believe, as Winrock International and APAEB, in the role of community members towards integrated sustainable development.”

- Misael Lopes da Cunha, President of APAEB

A Fund to Finance Clean Energy Projects: A mix of Lesson Learned and Success Story

Since 2001, BCEEP worked with fund management companies to create a mechanism to finance clean energy projects. Winrock signed an agreement of cooperation with A2R, through which on the one hand Winrock would help broaden its partner's portfolio of investments, and on the other A2R would finance RE projects that fell within the scope of Winrock's work through the Clean Tech Fund.

The start of operation of the Clean Tech Fund was delayed several times from its initial date of October 2001. The main obstacle was obtaining the US\$20 to 35 million dollars start-up capital. A series of events, led by the September 11th attacks, and followed by the continued crisis in Argentina, the uncertainties in the political scenario as 2002 was an election year in Brazil, the drop in value of the real against the dollar, the crisis in the middle east, and in general a worldwide reduction in foreign investment, stood in the way of the closing of the Clean Tech Fund. Moreover, progress was threatened when the president of A2R left the company.

In spite of the problems faced by A2R in 2001 and 2002, Econergy continued to work to secure sufficient investors to close the CleanTech Fund, achieving positive results with from four investors in 2003: MIF (IADB's Multilateral Investment Fund), NAFIN (Nacional Financiera, a Mexican Development Bank), CAF (Corporación Andina de Fomento, a multilateral financing institution in 16 Latin America countries), and FMO (a Dutch investment bank). In total, Econergy secured US\$ 22.5 million so far.

Several Brazilian projects are included in CTF's pipeline. Econergy will be serving as the sole fund manager of the CleanTech Fund. The fund will perform seven to ten investments total, all in Latin America countries (three to five in Brazil), mostly in renewable energy and energy efficiency. The fund is expected to start operations in January 2004.

EIC is planning to focus most of its CleanTech Fund activities in Brazil on the cogeneration market, specifically sawmill and sugarmill industries. Econergy Brasil is currently managing CO₂ emission credit application for carbon financing for 15 sugarmills in Brazil. Together those projects account for an installed capacity of 423.5MW and 6.6M tons of CO_{2e} reductions in a period of 7 years. The idea of financing micro-scale hydropower projects through the CTF was considered, however it could not be implemented, since the CTF will only take on projects requiring investments of US\$500,000 or more.

The Clean Tech Fund was expected to be the major source of financing of projects in BCEEP's pipeline. Unfortunately, the macro-economic-political situation during the program did not allow the fund to start operations during the program. Therefore, the more concrete results of this initiative (projects financed and carried out) are expected for the next years.

Lessons Learned

Micro-credit for solar systems

Under BCEEP, Banco do Povo led an initiative to provide solar home systems (SHS) to rural populations through micro financing, which would start in a pilot community of Minas Gerais State.

After taking part in a technology cooperation action with Sri Lanka, credit agents were trained in solar photovoltaic technology, Banco do Povo opened an R\$ 200,000 credit line for SHS and worked with the industry to find out adequate system sizes for typical clients. The leveraged resources were provided by the National Bank for Social Development of Brazil – BNDES. Studies showed that the costs of a SHS were prohibitive to local population.

The community of Minas Novas, in Minas Gerais, was selected for the pilot initiative, initially designed to reach 300 families. The size of the market, according to a survey performed in 2002, was 1411 families in Minas Novas that did not have electric energy from the grid. An equipment showcase started in the local agency (Banco do Povo acquired a solar lantern from a local distributor from a U.S. manufacturer: UNISOLAR).

Although the initiative was going well, in 2003, when sales would start, the economic situation in Brazil and especially in Minas Novas went through a hard time. The lack of rain in the region caused the agricultural production to decrease and led to a state of deeper poverty and even hunger among the rural communities. Some men migrated to other states, such as São Paulo, searching for an alternative work in the sugarcane fields to generate incomes for their families. Their purchase priorities changed, as the system price became too high for the rural population's average income.

Credit officers tried to overcome this barrier in a number of ways. Banco do Povo tried to leverage funds from CEMIG, the Minas Gerais State electricity company, which would subsidize 64% of the SHS price, leaving the remaining 36% to be paid by the micro-credit loan available. CEMIG had a plan to use solar energy in remote areas far from the grid and a partnership with the BCEEP micro-credit initiative would be mutually beneficial. However CEMIG later launched its Universal Access plan, as required by the new Federal regulation issued in 2003, according to which the entire State would be electrified within three years. A fund for loans created by the government to be accessed only by the utilities would be available at the interest rate of 6% a year. This situation was enough to abort Banco do Povo's approach with CEMIG.

Even with this scenario, Banco do Povo decided to finance the solar lanterns, which are more affordable and useful in a number of ways even after conventional grid electrification. Winrock Brazil identified the American supplier UNISOLAR. Sixty units were order by Banco do Povo, which already had 15 orders after the program was officially launched through a showcase in the region. Each lantern unit cost \$ 86 (R\$ 250). The program was extensively promoted through distribution of brochures and interviews to a local radio. Thirty solar lantern units were financed up to the moment.

In regards to solar home systems, a partnership with a local electric equipment company was also established. The company, experienced in installing solar systems under PRODEEM, will be responsible for sales, installation and maintenance of solar home systems financed by Banco do Povo. However, the price is still a major impediment. Up to the moment Banco do Povo could not find anyone in conditions to afford such high price.

BCEEP

USAID / Brazil Clean and Efficient Energy Program

The micro-credit experience carried out clearly showed the barriers faced by rural communities to purchase energy systems. Banco do Povo learned that most people who do not have electricity from the grid, hardly would have money to afford monthly payments for equipment that do not generate any income directly. It is recommended that future RE micro-credit initiatives address productive applications rather than solar home systems or solar lanterns. Additionally, coordination with energy utility is recommended. These measures are crucial to micro-finance success due to its long period for implementation and the need to recover investments.

In terms of financing SHS/solar lanterns, the lesson learned is that the market needs to be entirely known, as well the needs of the local population and the priorities in their lives in order to create or develop a program linked to the reality.

A very successful aspect of the project was to have a supplier and equipments arranged in advance, so the people could see and be familiar with the technology. This kind of familiarity is fundamental when dealing with new technologies and linking them to community's needs.

It is also recommended that the financial institution not be directly involved in the commercial relationship between the client and the equipment seller, due to the complexity of maintenance and warranty. The ideal situation is to have an agreement between the credit institution and the equipment dealer who would then interact with the end-user.

Banco do Povo intends to continue this program after BCEEP, however a shift of focus to finance renewable energy equipments that generate income is likely to occur.

Sustainability of renewable energy enterprises in Alagoas

The Eco-Engenho Institute is a non-profit organization, located in Maceió – Alagoas, composed by the team that developed, while in Teotonio Vilela Foundation (FTV), projects based on renewable sources for the Northeast Region of Brazil. The Renewable Energy Program for Micro-enterprises (Luz do Sol Program) has been stimulating the photovoltaic energy market through the establishment of Micro-Enterprises to supply renewable energy services to rural communities, by purchasing PV systems and leasing them to end-users.

The Luz do Sol Program started at FTV in 1996 with financing from Banco do Nordeste, aiming initially to finance 500 micro-entrepreneurs (R\$ 11.600.000 at that period equivalent to US\$ 11,485,148.00). The program, which financed 90 enterprises, was halted in August 2001. After two years of inactivity, Instituto Eco-Engenho was able to sign the cooperative agreement with FTV with support of IDB (Interamerican Development Bank) and start a diagnosis of the project to evaluate the institutional and financial state of the micro-enterprises included in the program. The diagnosis showed that although most of them were in debt with the bank, 90% continued to operate their PV systems and provide services to their clients. The lack of maintenance and technical assistance in the previous two years during negotiation process caused the entrepreneurs to search for common solutions, acquiring batteries and other required components by themselves, sometimes with poor efficiency.

Therefore, the study concluded that the technology was well accepted and integrated in the rural areas. The sustainability of the initiative is more related to the entrepreneurial management and the need for micro-credit fund for maintenance and new investments (working capital). Some 85% of the entrepreneurs reported that there is new demand for PV systems (8 to 15 per micro-enterprise, in average), which demonstrates that there is an unattended market.

On the other hand, high default rate in the semi-arid region of the Northeast Brazil is not peculiar to the Luz do Sol Program only. Instead, it is a symptom of several projects supported by Banco do Nordeste, due to the long dry periods, low income of the population and lack of policies that appropriately address social-economic development. For these reasons, 74% of the clients were in debt with the company, which together with the need for replacement of components caused the enterprises to be in debt with Banco do Nordeste. Similarly to the Banco do Povo micro-credit initiative in Minas Novas, the negative effects of the long dry seasons on the purchasing power of the communities in the Northeast of Brazil, and therefore on the payback of the loans, were enormous.

It was clear that the program had to be revitalized. Eco-Engenho supported this revitalization by replacing the failed batteries and charge controllers initially in 13 communities and renegotiating contracts with Banco do Nordeste. A revolving fund mechanism to sustain the operation was worked out with seed money coming from IDB support to Program. All batteries supplied to the 13 micro-enterprises in the first phase were financed by the fund. Therefore, when those batteries are paid back, this amount will remain in the fund to finance new batteries. In the next steps, Eco-Engenho will continue to work with Banco do Nordeste to improve the contracts, most of which are not up to date and use old economic inflation indexes (IGPDI or TJLP).

The Luz do Sol currently benefits a population of around 12.500 people in poor areas in the dry region of Alagoas State. Through the program around 200 small water supply systems and over 350 power systems for schools were installed to improve life quality in those communities. The Institute's work to create a success case will serve as a model to be replicated in other states of the Northeast. The revolving fund established is expected to bring sustainability to the project after BCEEP. The fund will be used to change batteries for the rest of the projects.

It is recommended that measures to deal with the economic situation caused by the long dry periods in the Northeast be taken into account by future programs.

Solar Energy Supply for an Ice Making Facility

Along the coast and on islands in the northeastern states of Brazil are living innumerable fishermen with their families, mostly in remote villages away from the power grid. Their major economic activity is fishing. However, fish, to be sold at competitive prices, has to be fresh. Without means of preservation, the fishermen are forced to sell their products to intermediaries for lower prices or even just in exchange for ice bars to keep the catch fresh at sea.

Solar or wind-energy powered ice making facilities could change this picture. With appropriate refrigeration, the fish can be preserved for a longer period, thus allowing the fishermen to sell it in the local market at higher prices, ultimately increasing their income. This project, carried out by IDER, had the goal to use solar energy to power an ice factory and prove its feasibility and sustainability through a revolving fund scheme.

A rural settlement (the village Apiques) was chosen in the Municipal district of Itapipoca, Ceara. Nearly four years ago the village participated in a World Bank project to provide an ice making facility powered by wind turbines. The villagers constructed the necessary infrastructure such as a fish processing building with an integrated cooling chamber and water supply for two scratch ice machines. However, the manufacturer of the turbines failed to deliver the equipment. The infrastructure was still in good condition, and the community, which already had a positive experience with solar home systems and revolving funds, was willing to participate in the project.

BCEEP supported the design of the system through computerized calculations that took into account the local meteorological data and the energy demand of the ice machines. The system layout was designed, wood structures built, and the necessary equipment selected, 58 solar modules, 4 charge controllers, 2 inverters, 32 batteries, cables and accessories.

The power demand in terms of solar modules and battery capacity could not be fully delivered by the manufacturer, which caused the ice machines to produce less ice than predicted.

After the installation procedures, the 2 original inverters had to be exchanged by 1 more powerful inverter, due to technical problems - the equipment was not adapted to the local conditions (high humidity and high temperature). This caused the whole wiring of the batteries and solar modules to be changed completely, which caused some delay in the project startup. The installation was accomplished by the team of IDER's technicians, with help of at-risk youth trained by the institute on renewable energy. Training for the local people on operation and maintenance was also carried out.

In an attempt to guarantee the sustainability of the project, the fishermen paid a certain amount (today R\$ 0.30 per kg) for the delivered ice. The money would be used to a maintenance fund. However, it was found out that the manufacturing of ice is not a financially sustainable operation. Although the project has a great social impact, external subsidy is in fact needed to maintain the system operating.

Lesson learned:

1. Equipments that have to be imported may represent a risk to the implementation of projects, due to the lack of adaptation to local climate conditions.
2. Manufacturing of ice is not a self-sustainable operation, needing external subsidy. Therefore, replication is not possible to accomplish through market-based mechanisms.
3. The project is justified for its social impacts.
4. PV energy was too expensive to generate ice under this project current condition.

Section IV - Impact on indicators and evaluation of SO2 indicators as a real project performance monitoring tool

From 2000 to 2003, Winrock and its partners actively developed the renewable and efficient energy agenda within the program with positive results in policy, capacity building, finance and international cooperation. The targets outlined in the Implementation Plan²¹, prepared in accordance with the USAID Brazil Energy Program strategic objectives, were met or exceeded in five of the six IR areas, even though the program was not fully funded (a reduction of around 10% occurred). Results for each IR Indicator are presented in the table below. While the area of Finance did not reach the amount to be leveraged, the factors that caused this setback in investment were not restricted to the RE/EE field in Brazil, but in fact contributed to the poor performance of financial investment worldwide.

Table 6. Projected and Attained Results²²

Intermediary Results Indicator			Projected ²³	Attained FY 2001	Attained FY 2002	Attained FY 2003	Attained (cumulative)
	IR 2.1/Ind. 2.1.1	Number of steps in the development of policies	5	9	6 (7)	13	29 (30)
	IR 2.2/Ind. 2.2.1	Number of key actors	7	1	4 (6)	5	10 (12)
	IR 2.3/Ind. 2.3.1	Number of projects underway	34	4	61 (10 ²⁴)	8	73 (22)
	IR 2.3/Ind. 2.3.2	Non-USAID resources leveraged (US\$ million)	99.7	3.98	10.2 (10.2)	11.82	26 (26)
	IR 2.4/Ind. 2.4.1	Number of Brazil/USA cooperation initiatives	7	1	4 (3)	3	8 (7)
	IR 2.3/Ind. 2.4.2	Number of cooperation projects	9	1	4 ²⁵ (3)	5	10 (9)

The numbers presented reflect Winrock's interpretation of results and indicators. Numbers in brackets correspond to different interpretation as reported in an independent consultancy report for year 2. Each of the results achieved is detailed in the following subsections.

²¹ Technical Application submitted to the RFA no. 512-00-005.

²² Values in brackets correspond to the independent consultant Marcia Cotta's interpretation of results attained.

²³ Cumulative values for fiscal years 2001, 2002 and 2003. Refers to the value to be achieved by the end of fiscal year 2003 (September 30, 2003).

²⁴ The various projects developed by ABESCO members were counted as 1 project (independent consultant Marcia Cotta's choice).

²⁵ Discounting one of the Vihhava's projects wrongly counted in the BCEEP's FY Annual report.

IR 2.1 – Targeted policies promoted that foster clean and efficient energy production and use

Indicator 2.1.1 – Advancement of policies and regulations by key actors that contribute to the adoption of concepts, methods, and technologies for clean and efficient energy production and use

Twenty-one steps were carried out during the program in promoting policies and resolutions that remove market barriers to clean and efficient energy technologies.

- **Analysis** of the draft resolution on the Energy Reallocation Mechanism (MRE)²⁶ for SHPs without centralized power dispatching.
- **Development** of an Action Plan on the use of PV systems within the Luz no Campo program's scope.
- **Development** of a proposal for resolution on compulsory purchase of energy from biomass sources, and a technical paper on implementing the BIO.COM program.
- **Development** of a policy-oriented report on the ESCO industry focusing on the EE market development and needs for consolidating and a proposal of a resolution for developing the EE market.
- **Development** of 2 documents submitted to ANEEL and presented at the Public Hearing on Enrollment Contracts between Utilities and Low Voltage Consumers.
- **Development** of the document "Regulation of the Quality of Electric Power Supplied by Autonomous Photovoltaic Systems". **Promotion** of new regulation by sharing with ANEEL the results of this study that may help ANEEL to come out with differentiated quality standards for distributed PV systems.
- **Development** of the report "ABESCO Program for Reduction of Electricity Consumption in the Productive Sector and Stimulation of the Energy Service Market".
- Within the Conservation group of MME's program for Revitalization of the Electric Sector, ABESCO **promoted** the structuring of EE in Brazil by signing an agreement with PROCEL to create models of certification of ESCOs.
- **Analysis** of the draft resolution on the CCC subsidy presented at a public hearing.
- **Analysis** of the draft resolution on eligibility criteria for the small-hydro power presented at public hearing.
- **Development** of a White Paper on renewable energy targets and integration with the third sector.
- **Promotion** of the PRISMA model of decentralized energy generation in rural communities
- **Analysis** of Decree 4541
- **Analysis** of the draft document on Universalization of Energy Services discussed at a public hearing
- **Analysis** of the Technical Standard ESCO9001.
- **Analysis** of energy efficiency policy mechanisms.
- **Promotion** of the Renewable Energy agenda within the National Congress by assisting Congressman João Caldas to set up a series of propositions.
- **Development** by RENOVE of a document providing suggestions to the policy development process with a third sector perspective.
- **Adoption** of regulation by the National Congress (PLv24-03) regarding benefits, authorization and commercialization criteria for Small Hydro Power Plants under 1,000 kW.
- **Analysis** of the proposal of the new electric sector model (PMSI) and submission of contributions regarding distributed generation and energy efficiency to MME.

Eight additional steps were carried out with regards to fiscal policy:

- **Analysis** of Bill no. 4783/2001 and decree no. 3827/2001 on PV tax exemption. **Development** of white paper identifying problems and proposing solutions.
- **Analysis** of the effect of reduced interest rates of BNDES financing for biomass projects.
- **Identification and analysis** of regulatory instruments and tax and tariff policies that could be applied to renewable energy sources in Brazil, and development of a proposal on tax and tariff incentives.
- **Development** of the technical note "Electric Power Generation from Biogas from Urban and Rural residues".

²⁶ MRE provides for a minimum revenue for hydroelectric plants, thus decreasing the risk associated with these ventures, making them more attractive for investors.

BCEEP

USAID / Brazil Clean and Efficient Energy Program

- **Adoption** by the federal government, through Law 10.438, of transmission tariff reductions for solar, wind and biomass power generation.²⁷
- **Development** of a study on Fiscal Incentives for Power Generation from Alternative Sources.

²⁷ BCEEP made an important contribution to this result by way of the technical note, written by CENBIO, “The Competitiveness of the Independent Energy Producers/Auto-Producers in Commercializing to Free Consumers in the Face of the New Tariffs Applied to the Use of the Distribution Systems.”

IR 2.2 - Increased access of key actors to information on market-based mechanisms for operating and financing clean and efficient energy production and use

Indicator 2.2.1 – Key actors using market-based mechanisms to operate and/or finance clean and efficient energy production and use

As extensively described in Section II, BCEEP provided support to a number of key actors that were strengthened during the program.

In FY2001, one key actor was strengthened: ABESCO. In FY2002, four key actors were strengthened: RENOVE, ABESCO, the Alvorada Program and CERPCH. In FY2003, two new key actors were strengthened: the micro-credit institution Banco do Povo and the grassroots NGO Terramar. Another market-based key actor was created, the ESCO Efficientia. Two other actors continued to receive strong BCEEP support in the last year, RENOVE and CERPCH.

These actors are serving as multiplying agents for dissemination of information and training and development of projects in their respective areas.

The program also provided significant support to strengthened two specific members of RENOVE, the NGOs IDER and Eco-Engenho, which were not counted individually, however.

IR 2.3 - Increased availability and use of financing for clean and efficient energy production and use

Indicator 2.3.1 – Clean and efficient energy projects under development that are funded by mechanisms created, leveraged or supported by USAID

Indicator 2.3.2 – Non-USAID funds influenced or leveraged to develop renewable energy, energy efficiency, or other clean energy projects, as a result of USAID activities

Table 7. Projects impacting indicators 2.3.1 and 2.3.2

Year	Project Title	Origin of non-USAID Resources	Non-USAID Resources leveraged
FY2001	5 PV Water pumping and filtering systems in Mamirauá Sustainable Development Reserve (1 project)	PTU 2000 ²⁸	US\$60,000
FY2001	57 PV systems for the electrification of schools (1 project)	SEINFRA-BA/ PRODEEM	US\$ 152,690
FY2001 and FY2002	Electrification of 4 communities in Ceará and Bahia with PV systems using the revolving fund mechanism developed by IDER ²⁹ (counted as 1 project in 2001 and not counted under IR 2.3.1 in 2002)	BP Solar	US\$34,125
FY2001 and FY2002	55 energy efficiency projects carried out by 25 ESCO members of ABESCO (counted as 1 project in 2001 and 54 project in 2002)	Several clients	US\$7.24 million
FY2002	20 PV water pumping and school systems total in Mamirauá Sustainable Development Reserve (1 project)	PRODEEM	US\$ 102,000
FY2002	341 Schools Electrified with PV systems -56 in Bahia, 157 in Ceará and 172 in Alagoas (4 projects)	PRODEEM	US\$ 1.53 million
FY2002	Revolving fund system for a solar powered ice factory in a fishing community in Ceará (1 project)	DEG -Deutsche Entwicklungsgesellschaft and Würth Solar of Brazil	US\$50,000
FY2002	9000 solar systems for PV electrification in Bahia (1 project)	COELBA / Luz no Campo	US\$ 5 million
FY2001 to FY2003	19 technical and financial feasibility studies carried out by CERPCH (not counted under IR 2.3.1)	Several private enterprises	US\$ 33,000
FY2003	Credit line for financing photovoltaic systems (1 project)	Banco do Povo	US\$60,600
FY2003	Support to Energy Efficiency Working Group (1 project)	World Bank/UNF/UNEP	US\$100,000
FY2003	PV-powered water pumping and irrigation in organic agriculture in Ceará (1 project)	British Embassy	US\$ 18,200
FY2003	Loan for the Bandeira Ceramic Energy Forest (1 project)	E&Co	US\$ 144,000
FY2003	44 additional PV systems for school electrification in Alvorada municipalities (1 project)	PRODEEM	US\$ 174,240
FY2003	PV-powered water pumping and irrigation in organic	Kellogg's Foundation	US\$ 13,000

²⁸ Humid Tropics Program, financed by the Ministry of Science and Technology.

²⁹ The amount leveraged did not consider what that was already available before BCEEP's interaction.

BCEEP

USAID / Brazil Clean and Efficient Energy Program

	agriculture in Bahia (1 project)	and APAEB	
FY2003	Clean Tech Fund (1 project)	MIF, NAFIN, CAF and FMO	US\$ 11.3 ³⁰ million
FY2003	FLUZ - Sustainability Fund for Luz do Sol Program (13 enterprises already revitalized and using the fund, 223 batteries financed) (1 project)	IADB	US\$ 20,000.00

³⁰ Estimated amount for projects in Brazil.

IR 2.4 Increased technology cooperation between U.S. and Brazilian firms for clean and efficient energy production and use

Indicator 2.4.1 – Cooperation initiatives (pilot programs, research/development delegations or other cooperation initiatives) that facilitated the application of clean and efficient energy technologies and know-how under Brazilian conditions

Indicator 2.4.2 - Clean and efficient energy projects of key actors, or influenced by key actors, which benefited from USAID/Brazil funded cooperation initiatives

In total **8** cooperation initiatives were carried out, leading to **10** benefited projects:

9. Cooperation Eenergy-INEE in Monitoring and Verification in EE (leading to **1 project**)
10. Cooperation E&CO-Eco Engenho to carry out B-REED in Alagoas (leading to **2 projects**)
11. Cooperation E&CO-Ider to carry out B-REED in Ceará
12. Winrock International and Banco do Povo pilot initiative to finance solar systems.
13. Cooperation NREL-Vibhava on cogeneration technologies (leading to **1 project**)
14. BP Solar-IDER and UNIFACS³¹ cooperation to install SHS and implement a revolving fund for system maintenance (leading to **4 projects**)
15. Agreement between Eco-Engenho and Aguasol to build a small demonstration project of a solar drier (leading to **1 project**)
16. Cooperation Unisolar – Banco do Povo in the supply of solar equipment (solar home systems and lanterns) for micro-credit financing (leading to **1 project**).

Please refer to Section II for further information.

³¹ For FY2002 this is being counted as 3 projects (1 community in CE and 2 community in BA). The cooperation initiative and 1 of the 4 projects were counted in FY 2001.

Evaluation of SO₂ Indicators

To evaluate the indicators as a real project performance monitoring tool, we considered two major criteria: *quality of indicators* chosen and *targets established*.

General evaluation and comments

Indicators were effective in terms of measuring the proposed program's results (IRs) but failed to capture its social impacts. Some, issues, although, are worth mentioning:

1. **Indicators 2.2.1 and 2.4.1.** Although the Mission has expressed its preference for not counting institutions participating in the BCEEP Consortium under these indicators³², when applicable, we understand that they should be counted, since many technology cooperation initiatives, which gave birth to several projects, were led by them. Similarly, the strengthening of some consortium members, such as CERPCH, was a strong strategic component of the Program. In most of the cases, these were the best targets in the country for the cooperation or capacity building efforts.
2. **Simultaneous impacts on more than one indicator.** The definition of indicators allowed for a single project to impact and therefore be counted under more than one indicator (Indicators 2.3.1 and 2.4.2). Although it is not clear if this was the Agency's intention, we suggest that counting the same project under these two indicators should be allowed. In most cases the development of the technology cooperation projects required non-USAID funds to be implemented, qualifying them to be counted under the funding leverage indicators.
3. **Targets dynamic correction.** Targets were set too high for some indicators (for example, funding leverage), which could have been reviewed and re-established throughout the Program. Similarly, low targets were set for others (for example, policy development steps). Dynamic correction of targets or re-definition of indicators could have avoided large gaps between anticipated and attained results.
4. **Long-Term Results.** Many results transcend the project's lifetime and will become apparent in the long-term.
5. **Social Impacts.** Finally, and most importantly, the IRs and associated indicators failed to capture equally important aspects of the program, namely the social aspects. While policies promoted, funds leveraged, cooperation initiatives and projects developed were successfully monitored, actual social and economic benefits to the target population were not addressed. Over 92,000 people and 407 communities benefited from renewable energy services and capacity building initiatives provided under BCEEP by the implementation team.

To measure wider impacts, directly related to the quality of lives of the beneficiary communities, one can refer to several researches available, such as the United Nations Indicators of Sustainable

³² It is worth to mention that the indicators description doesn't exclude consortium members of the range of possible targets of the program-sponsored activities.

BCEEP

USAID / Brazil Clean and Efficient Energy Program

Development³³, falling in four major categories: social, environmental, economic and institutional. Winrock International also developed a basic and simple set of indicators to monitor impacts of its activities, the Winrock Wide Impact Indicators³⁴, as described below:

BENEFICIARIES

Objective: To Help the Poor and Disadvantaged

Indicators: # of **Direct** Winrock beneficiaries (disaggregated by male/female)
of **Indirect** beneficiaries (disaggregated by male/female)

INCOME

Objective: To Increase the Net Income of Beneficiaries

Indicator: # of people reporting an increase of net individual income as a result of a specific income-generating activity, in each increment of rate increase (insignificant or unknown, 0-25%, 25 – 50%, 50% and up) (disaggregated by male/female)

PRODUCTIVITY

Objective: To Increase the Productivity of Beneficiaries

Indicator: # of people reporting an increase of quantity of goods produced/unit of land, in each increment of rate increase (insignificant or unknown, 0-25%, 25 – 50%, 50% and up) (disaggregated by male/female)

ENVIRONMENT

Objective: To Promote Environmentally Sustainable Practices

Indicator: # of hectares being managed under sustainable agriculture or natural resource management approaches, as advocated by Winrock

EMPLOYMENT

Objective: To Increase Sustainable Employment Opportunities

Indicator: # of new businesses (or enterprises) created (disaggregated by male/female)

CAPACITY BUILDING

Objective: To Increase Beneficiaries' Own Capacity for Improving Livelihoods

Indicator: # of people adopting practice learned from Winrock-facilitated training or workshop (disaggregated by male/female)

POLICY

Objective: To Influence Local, National, and/or International Policy by Providing Experienced Analysis to Local People

Indicator: # of laws or policies changed or enacted, in which Winrock has worked with others to affect the change

COMMUNITY PARTICIPATION

Objective: To Increase the Degree to Which Beneficiaries are Involved in the Management of the Winrock Project Which They Benefit From

Indicator: % contribution of beneficiaries to Winrock projects

We understand that many of impacts of these types were not monitored due to the difficulty and cost associated with the process of collecting trustworthy data. However, at the very least, the number of people benefited was counted for each project and should be included in the evaluation of the program's impacts.

³³ As part of the implementation of the Work Programme on Indicators of Sustainable Development (ISDs) adopted by the Commission on Sustainable Development (CSD), a working list of 134 indicators and related methodology sheets were developed, improved and tested at the national level by the world. Based on the voluntary national testing and expert group consultation, a revised set of 58 indicators and methodology sheets were made available for all countries to use. For more information see United Nations Division for Sustainable Development – National Information – Indicators of Sustainable Development.

³⁴ Winrock Wide Impact Indicators is a compilation of almost a year's worth of institutional exploration about Winrock International's impact measurement. This following institutional list of indicators is the result of an iterative process within the staff of Winrock. Each indicator is an attempt to "prove" the success of an objective that is included as part of Winrock's mission.

Specific Comments on Each Indicator

Indicator 2.1.1

The policy result indicator is the number of steps accomplished in policy formation. Steps are defined as: identification, analysis, development, validation, promotion, training, adoption, implementation and enforcement. The definition was broad enough to allow for many of BCEEP's policy contributions to be counted. In this sense, the results achieved exceeded by far the targets projected. This situation was identified early in the program's lifetime. On the other side, the steps "implementation" and "training" were never used, while "identification" was used only once. This may suggest that further explanation of such steps is necessary. A systematic follow-up mechanism to measure progress in the policy arena was also hard to carry out, since it required much "good will" from stakeholders, partner institutions and their representatives.

Indicator 2.2.1

The capacity building indicator is the number of key actors using market-based mechanisms to operate and/or finance clean and efficient energy production and use. Whether or not a specific institution strengthened should be selected as a "key actor" was always an issue. The importance of a given institution is subject to a broad contextual analysis and may lead to different interpretations. High turnover rates in Brazilian public actors also influenced BCEEP's capacity building efforts.

Indicator 2.3.1 and Indicator 2.3.2

The finance indicators, number of clean and efficient projects under development and U.S. Dollars (in Millions) leveraged to develop RE/EE or other clean energy projects, deserve some specific considerations. BCEEP's leverage rate was much too high, especially considering that most renewable energy projects in the rural areas are made of small-sized power systems.. Given USAID's investment of US\$ 2.7 million and the consortium's cost share of US\$ 1.6 million, the program directly received a total investment of US\$ 4.4 million from USAID and BCEEP's partners in Brazil. US\$ 26 million dollars were leveraged from non-USAID sources (not including the previously mentioned cost share and future unfolding of BCEEP's interventions), which represents almost 6 times the total amount invested, or almost 10 times the amount invested by USAID. The target, however, was 22 times the total amount invested, or 37 times USAID's investment. The large amount targeted resulted from the expectation that the Luz no Campo program, Brazil's largest electrification program, would allow US\$ 70 million (5% of its resources) to renewable energy. For a number of reasons, described in section I, this did not occur. A lesson to be learned from this is that targets can not be set depending on the expected outcome of a single strategy.

Indicator 2.4.1 and Indicator 2.4.2

The technology cooperation indicators are the number of cooperation initiatives and projects. For these indicators, the same general comment on the participation of consortium members applies. If the participation of member institutions of the BCEEP consortium was not to be taken into account, the targets should have been lowered, since our experience showed that the engagement of U.S. private sector and donation of equipment for demonstration projects was slowed down by currency fluctuations and an unfavorable international economic and political scenario.

V Sustainability Plan for the BCEEP actions after the end of the award

In this section the sustainability of BCEEP major initiatives is analyzed and recommendations are made when necessary.

Energy Efficiency Market Development

During the last three years, BCEEP supported the structuring of the ESCO market in Brazil through the following initiatives:

- Development/improvement/adaptation of models of performance contracting;
- Creation of a backbone framework for the certification of ESCOs;
- Technology cooperation on and dissemination of the M&V Protocol;
- Creation and support of the Financial Task Force;
- Development of arbitration procedures for contracting-related disputes.

The Financial Task Force efforts to develop mechanisms and models for financing energy efficiency projects pioneered under BCEEP will be continued in the next two years with World Bank/UNF/UNEP support³⁵. ABESCO, INEE, IBMEC and EIC will continue to act in Brazil and have institutional commitments to continuing the interaction with banks and donors aiming at the development of credit facilities and quality assurance tools and processes.

ABESCO was successful in assuring additional resources from PROCEL to continue carrying out the ESCOs accreditation initiative currently under public consultation by ABNT. The Association will certainly be affected by the interruption of BCEEP funding but is expected to continue playing a key role as disseminator of energy efficiency information to the market.

Renewable Energy Policy Development

Many important results in policy promotion were achieved by BCEEP, as described earlier. Renewable energy issues were addressed in major energy sector laws and regulation. However, to create conditions for the effective employment of renewable energy technologies, further work is needed. Brazil is still undergoing a very special period of changes in renewable energy regulation closely tied to major changes in both the overall Electricity Sector Model and its rural electrification strategy. Therefore, continuation of support from USAID/Brazil Energy program, under *Energia Produtiva* Program, in promoting regulatory and policy advances, will add to the important results achieved by BCEEP. In parallel, consortium members will keep participating in policy development efforts and will be able to continue advocating concepts developed under BCEEP.

³⁵ In March 2003, after two years of negotiations, the World Bank leveraged US\$ 100,000 for the Energy Efficiency Financing Task Force's activities, under the coordination of IBMEC (*Centro de Gestão de Energia – Ibmecc Business School*). The program, called *Programa de Incentivo ao Desenvolvimento de Mercado Financeiro para Eficiência Energética*, is taking place in Brasil, China and Índia, simultaneously.

Energia Produtiva will address policy development primarily by strengthening local NGOs and bringing RENOVE to the center of the policy development activity. Local level initiatives (state and regional) will be pursued by northern and northeastern partners. The support to RENOVE has created and will continue to create the conditions for member NGOs to advocate the use of renewable energy in universal energy access with a new perspective, adding the view of institutions that have been immersed in grass root renewable energy projects. The Network is focusing a large share of its current efforts to raise funds from third party donors. A working group on funding leverage has been established within the Network and a strategic plan has been developed. Nevertheless, the Executive Secretariat of RENOVE will continue to receive sponsorship to the implementation of its strategic planning from *Energia Produtiva* in the short and medium term.

Partnerships with the Public Sector

Many successful initiatives with the public sector were carried out within the BCEEP, including programs and agencies such as PRODEEM, Alvorada Portals in Bahia and the Luz no Campo Program. These fronts are developing into new initiatives that will revert into new projects for several BCEEP's consortium members. The final document on the revitalization of PRODEEM incorporated most of BCEEP's suggestions, which directly address the sustainability of PRODEEM's systems and advocate an increased participation of the third sector in its implementation. Of the 73 Alvorada Portals initially set up, nine have reached sustainability and started to operate with their own resources after the Federal Program was discontinued, in February 2003. The future of the remaining Portals still depends on the new Federal Government's position. For those portals that have reached sustainability, some of their coordinators received specific RE training and will be acting as promoters of the technology.

Renewable Energy Project Financing

All the productive projects started (organic agriculture, use of planted biomass by Bandeira Ceramic Industry, drying of fruits and marine algae among others) have leveraged non-USAID resources and are in the phase of project implementation. For these projects sustainability is linked to the commercialization of products, which in many cases has already begun. Some of these projects were developed in the "entrepreneurial" spirit, with BCEEP supporting not only technology interventions, but also business administration interventions, in a way that favors their sustainability. A number of other small hydro, solar and wind renewable energy projects identified have not yet been able to attract financing resources, although the projects were economically feasible. It is worth mentioning that projects, such as CERPCH's SHPs or the Wind Farms in Ceará, are in their way within the pipeline of several funding institutions and may take months or even years to be approved. It is very likely that some additional results of BCEEP will come to maturity in the future, increasing the already long list of achievements of the Program

Some additional information on financing projects in BCEEP's pipeline is worth mentioning:

CERPCH – The Center was turned into a business opportunities provider for the private sector, guaranteeing that support to SHP/MHP project development will be carried out in the future, mostly with private resources. Several projects are under negotiation with funding agencies and banks.

BCEEP

USAID / Brazil Clean and Efficient Energy Program

Banco do Nordeste - Negotiations with Banco do Nordeste to finance productive applications, started under BCEEP, will continue under Energia Produtiva. The Bank has provided Winrock with a Letter of Support and will discuss their engagement in the productive application of renewable energy initiatives with Winrock on a project-by-project basis.

CleanTech Fund – The fund is expected to start financing clean energy projects in January 2004. EIC will continue to lead this financing as the sole manager of the fund.

B-REED - In Alagoas and Ceará, BCEEP Partners will continue implementing B-REED and identifying and preparing projects for financing by E&Co. Business plans are being developed for at least five projects.

IDB – The in-house technical assistance provided to IDB has led to the inclusion in the Bank’s pipeline of two projects/concepts developed under BCEEP: PRISMA as a technology/institutional solution for isolated communities electrification in the Amazon Region; and a SHP/MHP projects pipeline development assistance fund. Both are moving forward within the Bank’s internal procedures. Technical assistance will last until April 2004.

Micro-credit for solar energy - Banco do Povo will continue financing renewable energy equipment with the credit line developed under BCEEP. A shift of focus to productive uses is recommended, as described in Section III. Banco do Povo will also provide training for NGO members of the Energia Produtiva consortium.

Revitalization of Luz do Sol - The revitalization of the program will continue with the resources from FLUZS, a micro-credit fund structured with IDB funds and worked out for this purpose, which will finance the acquisition of batteries by the users.

Productive Applications

By having been selected to carry out the Brazil Productive Energy Program – *Energia Produtiva* Program, several members of the BCEEP consortium will be able to continue working together and proceed with several activities initiated in the past three years.

Energia Produtiva builds on the achievements of BCEEP, adjusting for changes in the enabling environment, applying and multiplying the strong local NGO capability developed under BCEEP, and articulating new solutions contributing to the success of the Global Village Energy Partnership (GVEP). The goal is to stimulate economic growth, reduce poverty, and address climate change effects and other adverse environmental impacts through application of cost-effective, replicable, and income-generating RE technologies. The program adopts a chain of production approach: securing markets for final products, securing technology supply, ensuring participation of women, training (including disadvantaged youth), operation and maintenance, and quality control.

Design for a four-years lifetime, *Energia Produtiva* is divided into eight Working Groups: 1. Productive Drying Applications, 2. Productive Water Resource Applications, 3. Productive Biofuels Applications, 4. Education, 5. Fossil Fuel Substitution, 6. Decentralized Generation (PRISMA), 7. NGO Capacity Building, and 8. National Energy Policy. These working groups will implement

BCEEP

USAID / Brazil Clean and Efficient Energy Program

activities, mostly in the North and Northeast of Brazil, that significantly add to the sustainability of BCEEP's work, such as:

PRISMA

Winrock will continue to seek financing to implement a pilot of the PRISMA concept, in order to demonstrate to public authorities a viable alternative to grid extension in remote communities.

Training of Youth

Energia Produtiva intends to continue this very successful initiative, which has changed the life of dozens of youth in Ceará. The goal is to train at least 30 disadvantaged youth in renewable-energy per year, with certification by CEFET.

Productive Application of Renewable Energy

Energia Produtiva will stimulate cost-effective productive RE applications, including those that started to be explored under BCEEP, specifically: drying of fruits, vegetable, seaweed and pollen, micro-irrigation and organic agriculture. Technologies such as biodigestors of animal waste and efficient cookers will also be widely promoted. The goal is to obtain the engagement of public authorities, society and the private sector in order to scale up the use of these technologies and help foster social-economic growth.

Policy

The National Energy Policy working group, through Renove, will continue to make efforts to overcome the regulatory barriers that hinder the development of renewable energy in Brazil. In the states of Bahia, Ceará and Alagoas, local policy development will also be pursued.

For further information about the Energia Produtiva Program please visit the website:

<http://www.winrock.org.br/energiaprodutiva>.

Attachments

A. Real and personal property procedures: disposition of all acquired property and equipment

Inventory

Winrock International

DATE	Quantity	ITEM DESCRIPTION	PURCHASE PRICE (R\$)	STATUS
2000				
16/10/2000	4	CHAIRS (FIXED)	220,00	GOOD
16/10/2000	5	CHAIRS (FIXED) WITH ARMS	325,00	GOOD
16/10/2000	1	FILE CABINET WITH 04 DRAWERS	219,00	GOOD
16/10/2000	1	DIRECTOR CHAIR	145,00	GOOD
16/10/2000	1	TABLE WITH 03 DRAWERS	147,00	GOOD
16/10/2000	3	STEEL FILE CABINET	420,00	GOOD
16/10/2000	1	MEETING TABLE	108,00	GOOD
16/10/2000	1	FILE CABINET (2 DRAWERS)	147,00	GOOD
Sub-total 1			1.731,00	
2001				
Sub-total 2			0,00	
2002				
29/1/2002	1	TELEPHONE	792,00	GOOD
26/9/2002	1	SECRETARY CHAIR	91,20	GOOD
26/9/2002	4	CHAIRS	277,40	GOOD
26/9/2002	3	DIRECTORS CHAIR	646,40	GOOD
26/9/2002	1	DESK 1.6x.71x0.58 W/3 DRAWERS	396,00	GOOD
3/10/2002	2	DIRECTORS CHAIR	454,00	GOOD
17/10/2002		SOFTWARE LICENSES	3.978,00	GOOD
17/10/2002		SOFTWARE LICENSES	9.702,00	GOOD
Sub-total 3			16.337,00	
2003				
27/1/2003	1	SOFTWARE LICENSES	3.000,00	GOOD
27/1/2003	1	SOFTWARE LICENSES	2.060,00	GOOD
27/2/2003	1	SOFTWARE LICENSES	2.462,50	GOOD
Sub Total 4			7.522,50	
TOTAL			25.590,50	

Partners

WHO	Quantity	ITEM DESCRIPTION	PURCHASE PRICE (R\$)
ABESCO	3	DESKTOPS	R\$ 15.390,00
APAEB			
	1	WIRELESS INTERNET CONNECTION EQUIPMENT	R\$ 18.000,00
	1	RE IRRIGATION SYSTEM	R\$ 16.500,00
CERPCH			
	2	NOTEBOOKS	R\$ 7.329,00
	1	MULTIMEDIA PROJECTOR	R\$ 9.900,00
	6	DESKTOPS	R\$ 12.840,00
	1	LASER PRINTER	R\$ 1.240,00
	18	TABLES	R\$ 6.754,00
	2	LOCKERS	R\$ 1.486,00
	16	CHAIRS	R\$ 7.117,00
	48	CHAIRS FOR CONFERENCE ROOMS	R\$ 9.360,00
ECO-ENGENHO			
	1	DESKTOP	R\$ 1.860,00
	2	NOBREAKS	R\$ 223,00
	2	NOBREAK BATTERIES	R\$ 89,00
INEE			
	1	NOTEBOOK	R\$ 4.200,00
TOTAL			R\$ 96.898,00

Disposition Plan

On December 17th 2003, through a letter from the Agency, Winrock received USAID concurrence with the proposal to use the items found in its BCEEP Inventory in support of the Energia Produtiva Program, for the duration of the new program. This will represent a significant cost savings for the new program and avoid triggering unwanted ICMS tax liabilities under the new program.

For the other organizations, Winrock understands that leaving the equipment or infrastructure provided for these organizations contributes for the sustainability of NGOs that proved to be active actors in the renewable energy sector in Brazil. Many activities started at BCEEP will continue despite the end of the cooperative agreement, as fully described in Section V. Appropriate disposition of this

BCEEP

USAID / Brazil Clean and Efficient Energy Program

equipment will allow for USAID to continue supporting to some extent the long-term activities and results of these institutions' work.

B. Description of contents of enclosed CD-ROMs

The enclosed CD-ROMs contain all relevant digital files that resulted from program activities, including official documents, partner's deliverables, clipping of the media coverage, photo album, presentations, projects histories, publications and others. These files are organized in a list of directories as follows:

CD-ROM #1

- [Apresentações Comitê Coordenador]
- [Atas de Reuniões do Comitê Coordenador]
- [Clipping]
- [Descrição do Projeto e Planos de Trabalho]
- [Escopos de Trabalho dos Parceiros]
- [Fotos]
- [Infomativos]
- [IRs]
- [Match]
- [Relatórios]
- [Renove]
- [Small Grants]
- [Strategic Objective 2]

CD-ROM #2

- [Produtos do Winrock]
- [Produtos dos Parceiros]

Disks # 3 to 8 store additional files. Please refer to CD-ROMs' indexes for more information.

C. List of acronyms

A2R	A2R Environmental Funds
ABESCO	Brazilian Association of Energy Services Companies
ABNT	Brazilian Association of Technical Standards
ABRADEE	Brazilian Association of Power Distributors
AGERBA	Public Services Regulating Agency of Bahia
ANEEL	National Electric Energy Agency
APEG	APEG Consultria Empresarial, an institutional advisor
A-REED	Africa Renewable/Rural Energy Enterprise Development
APAEB	Association of Small Farmers of Bahia
BIO.COM	Emergency Program for Biomass Energy in Brazil
BNDES	Bank of Social and Economic Development of the Northeast
B-REED	Brazil Renewable/Rural Energy Enterprise Development
CAF	Corporación Andina de Fomento
CBEE	Brazilian Center of Wind Power
CCC	Fuel Consumption Account
CDE	Energy Development Account
CEFET	Federal Technical Center
CEMIG	Minas Gerais State electricity company
CENBIO	Biomass National Reference Center
CERPCH	Small Hydro Power Reference Center
CNI	National Industry Confederation
CNPE	Energy Policy National Council
CNPT	National Center for Sustainable Development of Traditional Communities
COELBA	The Bahia State Electricity Company
COOPERE	APAEB cooperative Bank
COOPERUNA	Cooperative of producers of Una
CRESESB	The Brazilian Reference Center for Solar and Wind Energy
CTF	CleanTech Fund
DEG	Deutsche Entwicklungsgesellschaft
E&CO	Energy through Enterprise
E2P2	Energy Efficiency and Pollution Prevention
EE	Energy Efficiency
EIC	Econergy International Corp.
ESCO	Energy service company
FIESP	São Paulo Industry Federation
FLEM	Luís Eduardo Magalhães Foundation
FLUZ	Fundo de Sustentabilidade do Projeto Luz do Sol
FMO	Dutch investment bank
FTF	Financial Task Force
FTV	Teotônio Vilela Foundation
GCE	Energy Crisis Management Council
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
GVEP	Global Village Energy Partnership
HDI	human development index
HSET	Hemispheric Sustainable Energy and Transportation
IADB	Interamerican Development Bank
IBAMA	Brazilian Institute of the Environment
IDB	Interamerican Development Bank
IDEAAS	Institute for Sustainable Development and Renewable Energy
IDER	Institute for Development of Renewable Energy
IEEE	Institute of Electrical and Electronics Engineers
IGPDI	General price index
IIEC	International Institute for Energy Conservation
INEF	National Institute for Energy Efficiency

BCEEP

USAID / Brazil Clean and Efficient Energy Program

IPI	Manufactured Goods Tax
IPMVP	International Performance Measurement and Verification Protocol
IR	Intermediate Result
LWA	Leader with Associates
M&V	Measurement and Verification
MCT	Ministry of Science and Technology
MHP	Mycro Hydro Power
MIF	IADB's Multilateral Investment Fund
MMA	Ministry of Environment
MME	Ministry of Mines and Energy
MOU	Memorandum of Understanding
MRE	Energy Reallocation Mechanism
NAFIN	Nacional Financeira
NEPA	Núcleo de Ensino e Pesquisa Aplicada
NREL	National Renewable Energy Laboratory
PMSI	Proposal of the new electric sector model
PNUD	United Nations Development Programme
POMMAR	Prevention Oriented to At-Risk Youth
PPA	Power Purchase Agreement
PPT	Thermoelectricity Priority Program
PROCEL	National Program for Energy Conservation
PRODEEM	Program for Energy Development of States and Municipalities
PROEÓLICA	Emergency wind power program
PROINFA	National Program for Incentive of Alternative Energy Sources
PSA	Health and Joy Project
PV	Photovoltaic
RE	Renewable Energy
RENOVE	National Network of Civic Organizations for Renewable Energy
RESEB	Electric Sector Restructuring Plan
SEAGRI	State Secretary of Agriculture
SEBRAE	Brazilian Service of Support to Micro and Small Enterprises
SEEDS	Savordaya Economic Enterprise Development Services (Guarantee) Ltd.
SEINFRA	Secretary of Infrastructure
SHP	Small Hydro Power Plants
SHS	Solar home systems
SO2	Strategic Objective 2
TJLP	Long term interest rate
UN	United Nations
UNEP	United Nations Environment Programme
UNF	United Nations Foundation
UNIFACS	University of Salvador
USAID	United States Agency for International Development
USP	University of São Paulo
VE	Economic Values
WEA	Williams Engineering Associates
WEM	Wholesale Energy Market

D. Final Financial Report

ABESCO 
Associação Brasileira das Empresas de
Serviços de conservação de Energia

 **ECONERGY**
INTERNATIONAL

 **BANCO
DO POVO**

uma idéia que deu certo



APEG



IIEC

INEE INSTITUTO
NACIONAL
DE EFICIÊNCIA
ENERGÉTICA

 **WINROCK**
INTERNATIONAL
BRASIL


Fundos
Ambientais

EÓLICA

CENTRO BRASILEIRO
DE ENERGIA EÓLICA



INSTITUTO
ECO-ENGENHO




UNIFACS
UNIVERSIDADE
SALVADOR
BARRIS


APAEB



DEMS

CH

Consultoria em Engenharia S/C


NREL

 **VIBHAVA**
CONSULTORIA EMPRESARIAL


seeds
LABORATÓRIO
DE SEMENTES

